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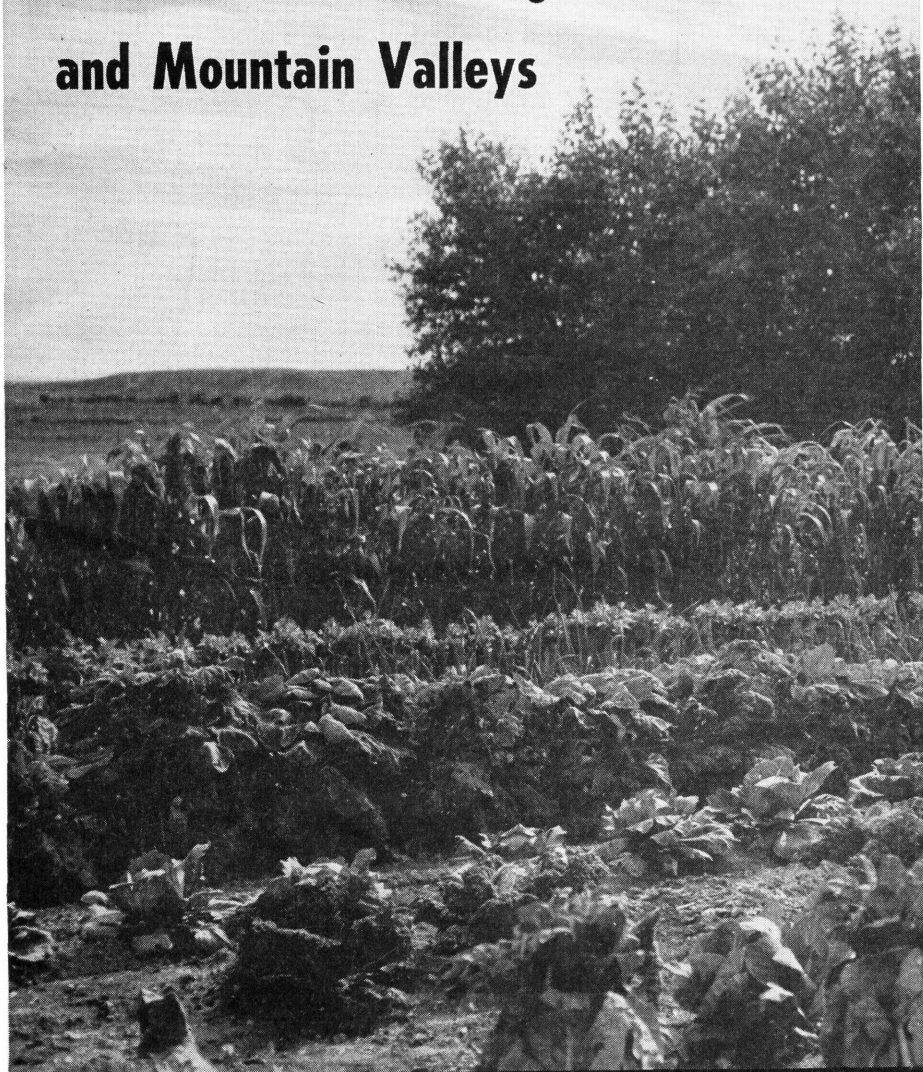
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U. S. DEPARTMENT OF AGRICULTURE

HOME VEGETABLE GARDENING

**in the Central and High Plains
and Mountain Valleys**



**Farmers' Bulletin No. 2000
U. S. DEPARTMENT OF AGRICULTURE**

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HOME VEGETABLE GARDENING

in the Central and High Plains and Mountain Valleys

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PROBLEMS OF HOME VEGETABLE GARDENERS

HOME VEGETABLE GARDENERS in the central and high Plains and mountain valleys have increased their own problems by using cultural and varietal recommendations made for other parts of the country where vegetable gardeners have very different problems.

Most soils in this region are neutral or alkaline in reaction; that is, they contain an adequate amount to an excess of lime. Despite this fact, many home gardeners lime their soils, thereby not only wasting their time and material but in many cases actually injuring their crops. Irrigation, too, presents certain problems peculiar to the region: the higher elevations, where the average temperatures are lower and the growing seasons shorter than in most other parts of the United States where irrigation is needed, call for different irrigation practices. Furthermore, the use of fertilizers, the location and exposure of the garden, and the use of windbreaks differ more or less from practices in other parts of the country.

Altitude is more important than latitude in governing the climatic conditions and, consequently, the crops and varieties that can be grown in a given locality in the region discussed in this bulletin (fig. 1). Because differences in elevation between localities only a few miles apart may produce greater changes in climatic conditions than found across entire States having an essentially level topography, recommendations as to crops and varieties must take into account altitude.

Many varieties or crops well adapted to other regions are not suitable for this region. Certain tomato varieties, for example, fail to set fruits here or set them so late that they do not mature.

¹Grateful acknowledgment is made of the assistance given in testing vegetable varieties by J. A. Hill, director of the Wyoming Agricultural Experiment Station; by W. L. Quayle, director of Wyoming Experiment Farms; by the several superintendents of the Wyoming Experiment Farms; by H. J. Henney, director of the Colorado Agricultural Experiment Station; by A. M. Binkley, head of the department of horticulture, Colorado Agricultural and Mechanical College; by the several superintendents of the Colorado State substations; and by the superintendents of various Nebraska State substations. Without their cooperation and assistance it would have been almost impossible to test such a large number of crops and varieties over such a wide range of cultural conditions.

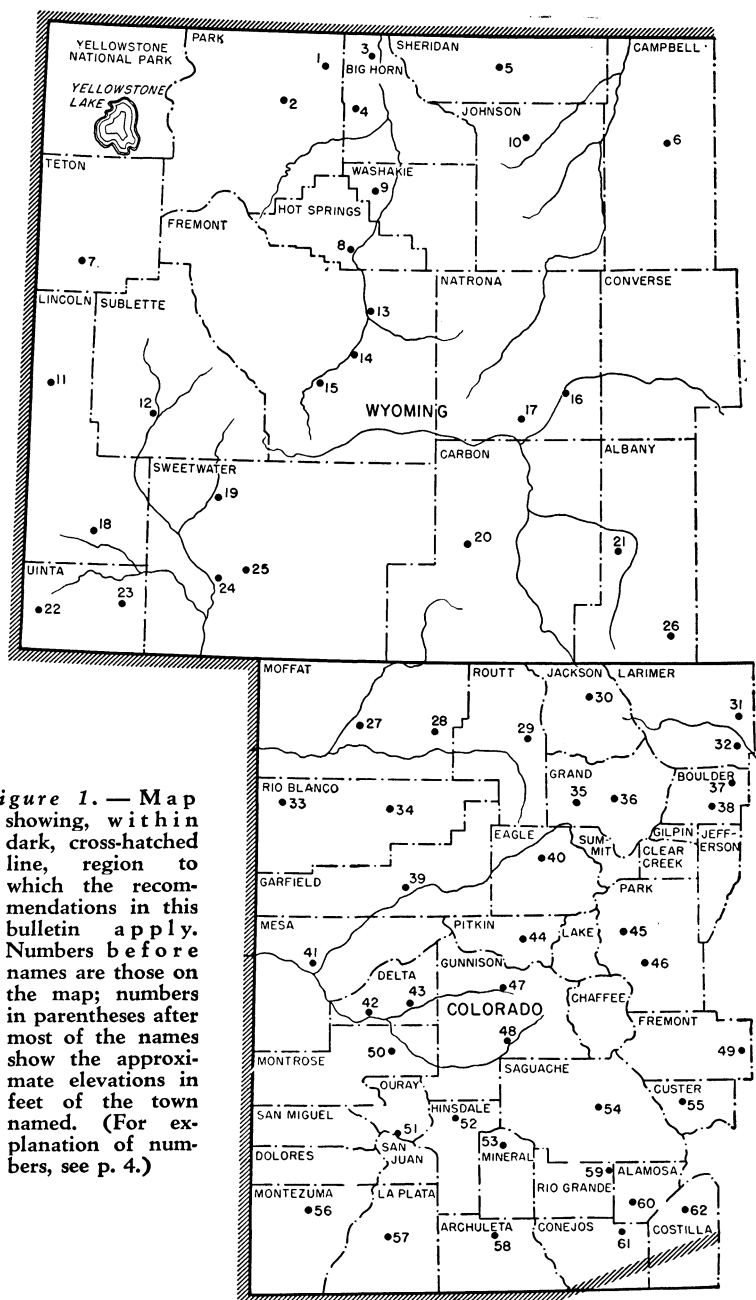
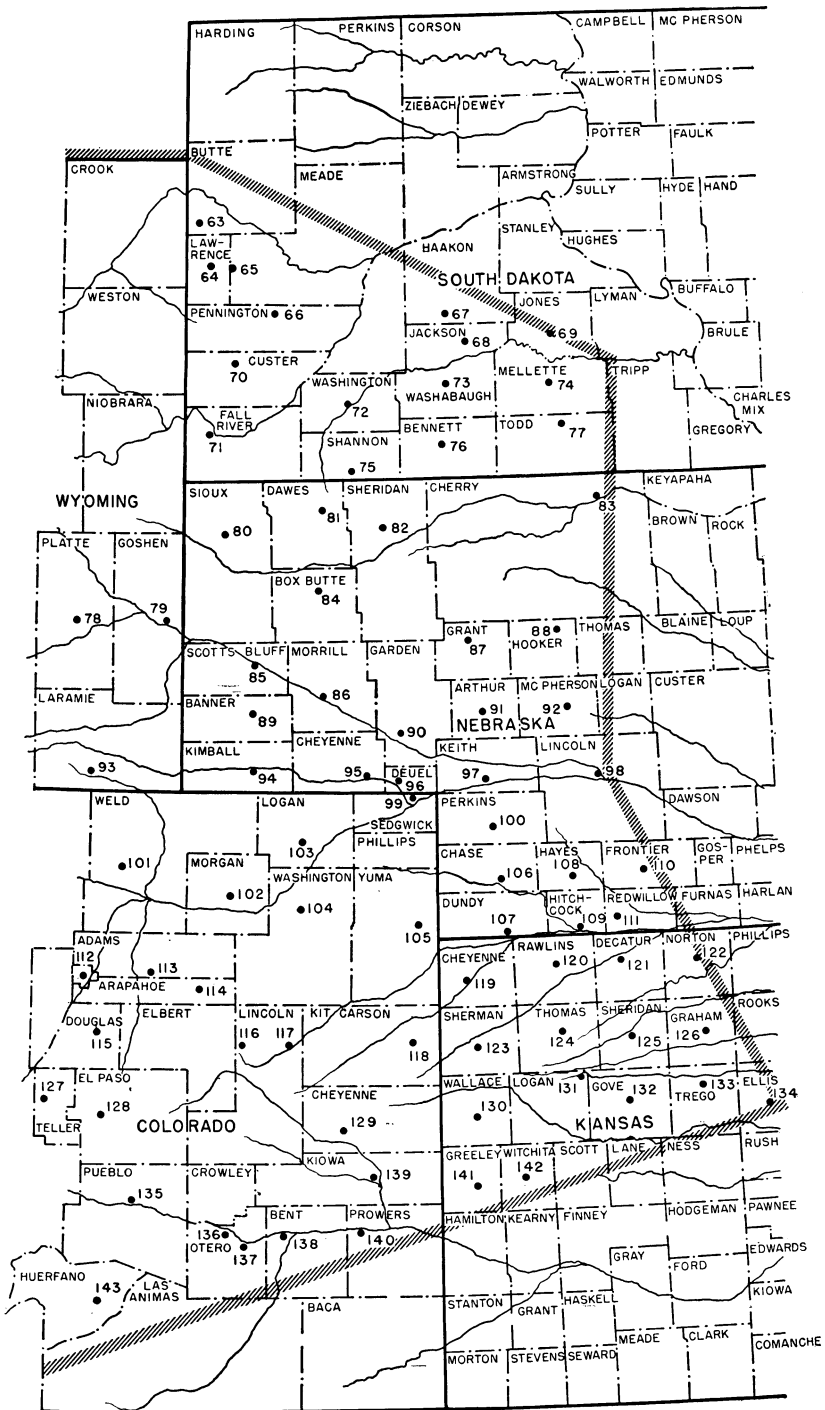


Figure 1. — Map showing, within dark, cross-hatched line, region to which the recommendations in this bulletin apply. Numbers before names are those on the map; numbers in parentheses after most of the names show the approximate elevations in feet of the town named. (For explanation of numbers, see p. 4.)



The frequent failures or semifailures of cucumbers are partly explained by the fact that certain varieties widely advertised for other regions produce no female flowers here. Similar examples of unsuitable varieties could be given for several other vegetables.

The mere fact that differences exist between the central and high Plains and other parts of the country does not mean that vegetable production is more difficult here. It does mean, however, that certain cultural practices should be changed somewhat and that only adapted crops and varieties should be grown. If these things are done, a large and varied supply of vegetables can be grown in most parts of the region.

BASIS FOR RECOMMENDATIONS

The recommendations given in this bulletin as to suitable cultural practices, crops, and varieties are based on vegetable-

LEGEND FOR FIGURE 1.—Continued

1, Powell (4,390); 2, Cody (4,980); 3, Lovell (3,815); 4, Greybull (3,790); 5, Sheridan (3,740); 6, Gillette (4,540); 7, Jackson (6,735); 8, Thermopolis (4,325); 9, Worland (4,060); 10, Buffalo (4,635); 11, Afton (5,135); 12, Big Piney (6,800); 13, Shoshoni (4,820); 14, Riverton (4,955); 15, Lander (5,370); 16, Casper (5,115); 17, Alcova (5,310); 18, Kemmerer (6,910); 19, Farson (6,580); 20, Rawlins (6,785); 21, Rock River (6,910); 22, Evanston (6,745); 23, Lyman (6,695); 24, Green River (6,080); 25, Rock Springs (6,260); 26, Laramie (7,165); 27, Maybell (5,905); 28, Craig (6,200); 29, Steamboat Springs (6,100); 30, Walden (8,300); 31, Fort Collins (4,985); 32, Loveland (4,985); 33, Rangely (5,350); 34, Meeker (6,180); 35, Kremmling (7,320); 36, Hot Sulphur Springs (7,755); 37, Longmont (4,980); 38, Boulder (5,350); 39, Rifle (5,300); 40, Wolcott (6,965); 41, Grand Junction (4,575); 42, Delta (4,970); 43, Hotchkiss (5,360); 44, Aspen (7,930); 45, Fairplay (9,895); 46, Hartsel (8,875); 47, Crested Butte (8,865); 48, Gunnison (7,675); 49, Canon City (5,330); 50, Montrose (5,800); 51, Telluride (6,745); 52, Lake City (8,675); 53, Creede (8,840); 54, Saguache (7,745); 55, Westcliffe (7,850); 56, Dolores (6,945); 57, Durango (6,550); 58, Pagosa Springs (7,095); 59, Monte Vista (7,655); 60, Alamosa (7,535); 61, La Jara (7,595); 62, Fort Garland (7,995); 63, Belle Fourche (3,000); 64, Deadwood (4,545); 65, Sturgis (3,450); 66, Rapid City (3,230); 67, Philip (2,215); 68, Kadoka (2,480); 69, Murdo (2,325); 70, Custer (5,300); 71, Edgemont (3,445); 72, Rockyford (5,275); 73, Wanblee; 74, White River (2,135); 75, Pine Ridge; 76, Martin (3,330); 77, Mission (2,590); 78, Wheatland (4,725); 79, Torrington (4,100); 80, Harrison (4,880); 81, Chadron (3,395); 82, Rushville (3,740); 83, Valentine (2,585); 84, Hemingford (4,260); 85, Scottsbluff (3,880); 86, Bridgeport (3,655); 87, Hyannis (3,740); 88, Mullen (3,200); 89, Harrisburg; 90, Oshbosh; 91, Arthur; 92, Tryon; 93, Cheyenne (6,100); 94, Kimball (4,710); 95, Sidney (4,085); 96, Chappell (3,695); 97, Ogallala (3,215); 98, North Platte (2,800); 99, Julesburg (3,470); 100, Grant (3,410); 101, Greeley (4,665); 102, Fort Morgan (4,340); 103, Sterling (3,930); 104, Akron (4,670); 105, Wray (3,530); 106, Imperial (3,280); 107, Benkelman (2,970); 108, Hayes Center; 109, Trenton (2,680); 110, Stockville (2,480); 111, McCook (2,510); 112, Denver (5,280); 113, Bennett (5,485); 114, Deertrail (5,185); 115, Castle Rock (6,205); 116, Limon (5,355); 117, Arriba (5,245); 118, Burlington (4,165); 119, Saint Francis (3,290); 120, Atwood (2,845); 121, Oberlin (2,560); 122, Norton (2,275); 123, Goodland (2,685); 124, Colby (3,140); 125, Hoxie (2,655); 126, Hill City (2,135); 127, Florissant (8,180); 128, Colorado Springs (5,980); 129, Kit Carson (4,285); 130, Sharon Springs (3,440); 131, Oakley (3,050); 132, Gove; 133, Wakeeney (2,465); 134, Hays (2,000); 135, Pueblo (4,690); 136, Rocky Ford (4,175); 137, La Junta (4,050); 138, Las Animas (3,885); 139, Chivington (3,885); 140, Lamar (3,610); 141, Tribune (3,545); 142, Leoti (3,295); 143, Walsenburg (6,185).

variety trials during the past 12 years at 20 to 30 stations widely distributed through the central and high Plains and mountain valleys. Because of the large numbers of crops and varieties involved, the procedure was to conduct large-scale variety trials at the Cheyenne Horticultural Field Station of the United States Department of Agriculture. Then the more promising varieties were selected for testing as to their local adaptation elsewhere. Thus the cooperative trials were kept at the minimum necessary for an adequate test, and the main tests were made where complete data could be taken. Over 1,000 varieties and strains of tomatoes, for example, were tested at the Cheyenne station; but only about 100 were sent to the cooperators and not more than 50 to a single cooperator.

CLIMATE AND ALTITUDE

The region in which the cooperative vegetable-variety tests were conducted is shown in figure 1. From east to west, this region may be divided into four general sections as regards elevation, natural vegetation, and climatic conditions.

In the eastern section, extending from near North Platte, Nebr., on the east to the Wyoming border on the west, the altitudes range from 2,000 to 4,500 feet. The average annual precipitation ranges from 15 to 20 inches, of which 12 to 18 inches falls from April to September. The average number of days without killing frost ranges from 130 to 160, except in southeastern Colorado, where the growing season is somewhat longer. The average temperatures for June, July, and August range from 70° to 80° F. The average dates of the last killing frost in the spring range from about May 1 in the more easterly and southerly parts to about May 11 in the west; the average dates of the first killing frost in the fall range from about October 11 in the east to about September 21 in the westerly part. The low rainfall and fairly high summer temperatures make irrigation desirable for the growing of most vegetables. Because of the long season it is possible to grow a wide range of crops by adjusting planting dates or by growing extra-early- or extra-late-maturing varieties. Here variety selection is more important than crop selection (table 1).

The second section extends from about the eastern boundary of Wyoming to the high plains bordering the foothills of the Rocky Mountains. Altitudes range from 4,500 feet in the more easterly part to 6,000 feet in the west. The average annual precipitation ranges from 10 to 15 inches, of which from 9 to 12 inches falls from April to September. The average number of days without killing frost ranges from 100 to 130. The average temperatures for June, July, and August range from 60° to 70° F. The average dates of the last killing frost in the spring range from about May 11 in the more easterly part to about June 1 in the westerly part; the average dates of the first killing frost in the fall range from about September 21 in the east to about September 11 in the west. The lower summer temperatures offset in part the lack of rainfall, but irrigation is an aid in growing most vegetables. Wherever irrigation is available,

TABLE 1.—*Vegetable varieties adapted to different altitude ranges in the central and high Plains and mountain valleys*

[Altitude ranges correspond to the 4 topographical sections described on p. 5. The ratings good, fair, and poor refer mainly to how well a variety is adapted to the various altitude ranges. Good indicates that the variety is among the best of those of its kind recommended for the particular altitude range; fair, that the variety is recommended, but is inferior in certain respects to one rated good; poor, that the variety cannot be expected to succeed except under exceptionally favorable conditions for the particular altitude; blank, that the variety is not recommended]

Vegetable and variety	Relative earliness ¹	Rating at altitude of—			
		2,000 to 4,500 feet	4,500 to 6,000 feet	6,000 to 7,000 feet	7,000 feet and over
Asparagus:					
Mary Washington.....	1	Good	Good	Good	Good
Beans (bush, snap, green-podded):					
Bountiful.....	1	Fair	Fair	Fair	
Burpee Stringless Green Pod.....	1	Good	Good	Good	
Giant Stringless Green Pod.....	2	-do-	-do-	-do-	
Idaho Refugee.....	3	-do-	-do-	-do-	
Tendergreen.....	2	-do-	-do-	-do-	
U. S. No. 5 Refugee.....	3	-do-	-do-	-do-	
Beans (bush, snap, wax-podded):					
Pencil Pod Black Wax.....	2	-do-	-do-	-do-	
Round Pod Kidney Wax.....	2	-do-	-do-	-do-	
Sure Crop Wax.....	2	Fair	Fair	Fair	
Beans (pole, snap):					
Blue Lake Stringless.....	3	Good	Good	Poor	
Kentucky Wonder.....	3	Fair	Fair	-do-	
Beans (bush, shell):					
Dwarf Horticultural.....	2	Good	Good	Good	
French Horticultural.....	3	Fair	Fair	Fair	
Beans (pole, shell):					
London Horticultural.....	3	Good	Good	Poor	
Beans (bush, lima):					
Early Baby Potato.....	2	Fair	Fair	-do-	
Fordhook Bush.....	3	-do-	-do-	-do-	
Henderson Bush.....	1	Good	Good	-do-	
Jackson Wonder.....	2	Fair	Fair	-do-	
Peerless.....	1	Good	Good	-do-	
Beans (pole, lima):					
Florida Butter.....	2	-do-	-do-	-do-	
King of the Garden.....	3	Fair	Fair	-do-	
Sieva (Carolina).....	1	Good	Good	-do-	
Beets:					
Asgrow Wonder.....	1	-do-	-do-	Good	Good
Crosby Egyptian.....	1	-do-	-do-	-do-	-do-
Detroit Dark Red.....	2	-do-	-do-	-do-	-do-
Long Smooth Blood Red.....	3	Fair	Fair	Fair	Poor
Broccoli (sprouting broccoli):					
Christmas Calabrese.....	1	Good	Good	Good	Good
Freezers Sprouting Green.....	2	-do-	-do-	-do-	-do-
Brussels sprouts:					
Improved Dwarf.....	1	Fair	-do-	-do-	Poor
Long Island Improved.....	2	-do-	-do-	-do-	-do-
Oregon Special.....	3	-do-	-do-	-do-	-do-
Perfection.....	2	-do-	-do-	-do-	-do-
Cabbage:					
All Seasons.....	2	-do-	Fair	-do-	-do-
Chieftain Savoy.....	2	-do-	Good	Poor	-do-
Cornell Savoy.....	2	-do-	-do-	-do-	-do-
Danish Ballhead.....	3	Good	-do-	-do-	-do-
Early Jersey Wakefield.....	1	-do-	-do-	Good	Good
Glory of Enkhuizen.....	2	-do-	-do-	-do-	Poor
Golden Acre.....	1	-do-	-do-	-do-	Good
Perfection Drumhead Savoy.....	3	-do-	Fair	Poor	Poor
Premium Late Flat Dutch.....	3	Fair	-do-	-do-	-do-
Succession.....	2	-do-	-do-	Fair	-do-
Wisconsin Hollander.....	3	-do-	-do-	Poor	-do-
Cantaloups (muskmelons):					
Casaba (Golden Beauty).....	3	Good	Poor	-do-	
Emerald Gem.....	1	Fair	Good	Fair	
Extra Early Hackensack.....	1	-do-	-do-	Good	
Extra Early Knight.....	1	-do-	-do-	-do-	
Extra Early Osage (Millers Cream).....	2	-do-	-do-	Poor	
Golden Champlain (Lake Champlain).....	1	-do-	-do-	Good	
Hales Best No. 36.....	1	Good	-do-	Poor	
Honey Dew, Green Fleshed (Antibes).....	3	-do-	Poor	-do-	
Honey Rock (Sugar Rock).....	1	-do-	Good	-do-	
Imperial No. 45.....	2	-do-	Poor	-do-	
Perfecto.....	2	-do-	-do-	-do-	
Rocky Ford (Netted Gem).....	2	-do-	-do-	-do-	
Tip Top.....	2	Fair	-do-	-do-	

See footnotes at end of table.

TABLE 1.—*Vegetable varieties adapted to different altitude ranges in the central and high Plains and mountain valleys—Continued*

Vegetable and variety	Relative earliness ¹	Rating at altitude of—			
		2,000 to 4,500 feet	4,500 to 6,000 feet	6,000 to 7,000 feet	7,000 feet and over
Carrots:					
Danvers Half Long.....	3	Good	Good	Good	Good
Early Scarlet Horn.....	1	Fair	Fair	-do-	-do-
Imperator.....	3	Good	Good	-do-	Fair
Morse's Bunching.....	3	-do-	-do-	-do-	-do-
Nantes (Coreless).....	1	-do-	-do-	-do-	Good
Red Core Chantenay.....	2	-do-	-do-	-do-	-do-
Cauliflower:					
Danish Giant (Dry Weather).....	2	Fair	-do-	-do-	Poor
Early Snowball.....	1	-do-	-do-	-do-	Fair
Celeriac:					
Large Smooth Prague.....	1	Good	-do-	Fair	
Celery:					
Easy Blanching.....	2	Fair	-do-	Good	Poor
Emperor (Fordhook).....	3	Good	-do-	Poor	-do-
Giant Pascal.....	3	-do-	-do-	-do-	-do-
Golden Plume (Wonderful).....	1	Fair	Fair	Fair	-do-
Golden Self Blanching.....	1	Good	Good	Good	Fair
Utah.....	3	-do-	-do-	Poor	Poor
Celtuce:²					
Chard (Swiss chard):					
Fordhook Giant.....	1	-do-	-do-	Good	Good
Lucullus.....	1	-do-	-do-	-do-	-do-
Chinese cabbage:					
Cheefoo.....	1	Fair	-do-	-do-	-do-
Chihli.....	1	-do-	-do-	-do-	-do-
Chives.....	1	Good	-do-	-do-	-do-
Collards:					
Georgia.....	1	-do-	-do-	-do-	Fair
Louisiana Sweet.....	2	-do-	-do-	-do-	-do-
Corn, Sweet:					
Country Gentleman (Shoepeg).....	3	-do-	Fair	Poor	
Early Golden Sweet.....	1	Fair	Good	Fair	
Golden Bantam.....	2	Good	-do-	Poor	
Golden Cross Bantam.....	2	-do-	-do-	-do-	
Golden Early Market.....	1	Fair	-do-	Fair	
Golden Gem.....	1	-do-	-do-	Good	
Pickaninny.....	1	-do-	Fair	-do-	
Stowells Evergreen.....	3	Good	-do-	Poor	
Sunshine.....	1	Fair	Good	-do-	
Cucumbers (slicing):					
Arlington White Spine.....	1	Good	-do-	Good	
Colorado.....	2	-do-	-do-	Fair	
Longfellow.....	3	Fair	Fair	-do-	
Straight-8.....	2	Good	Good	-do-	
Cucumbers (slicing and pickling):					
Early Cluster.....	1	Fair	Fair	Good	
Cucumbers (pickling):					
Chicago Pickling (Westerfield).....	2	Good	Good	Fair	
Mincu.....	2	Fair	-do-	Good	
National Pickling.....	1	Good	-do-	-do-	
Snows Pickling.....	1	-do-	-do-	-do-	
West India (gherkin).....	3	-do-	-do-	Fair	
Eggplant:					
Black Beauty.....	2	-do-	-do-	Poor	
Black King.....	1	Fair	-do-	Good	
Blackie.....	1	-do-	-do-	-do-	
Extra Early Dwarf Purple.....	1	-do-	-do-	-do-	
Long Purple.....	2	-do-	-do-	-do-	
New Hampshire Hybrid.....	2	Good	-do-	Fair	
New York Improved Spineless.....	3	-do-	Fair	Poor	
Endive:					
Broad Leaved Batavian (escarole).....	1	Fair	-do-	Fair	Fair
Full Heart Batavian (escarole).....	1	Good	Good	Good	Good
Green Curled.....	2	Fair	-do-	-do-	-do-
Green Curled Red Ribbed.....	2	Good	-do-	Fair	Fair
White Curled.....	2	Fair	Fair	Good	Good
Horseradish:					
Maliner Kren (Bohemian).....	1	-do-	-do-	-do-	-do-
Jerusalem-artichoke:					
Mammoth French White.....	3	-do-	-do-	-do-	-do-
Kale:					
Dwarf Blue Curled Scotch.....	1	-do-	-do-	-do-	-do-
Dwarf Green Curled Scotch.....	1	-do-	Good	Fair	Fair
Dwarf Siberian.....	2	Good	-do-	-do-	Poor
Tall Green Curled Scotch.....	3	Fair	Fair	-do-	Fair
Kohlrabi:					
Purple Vienna.....	2	-do-	-do-	-do-	-do-
White Vienna.....	1	-do-	Good	Good	Good

See footnotes at end of table.

TABLE 1.—*Vegetable varieties adapted to different altitude ranges in the central and high Plains and mountain valleys—Continued*

Vegetable and variety	Relative earliness ¹	Rating at altitude of—			
		2,000 to 4,500 feet	4,500 to 6,000 feet	6,000 to 7,000 feet	7,000 feet and over
Leeks:					
American Flag (London Flag).....	1	Good	Good	Good	
Giant Musselburg.....	2	Fair	Fair	Fair	
Monstrous Carentan.....	3	Good	Good	-do-	
Lettuce (butterhead):					
Big Boston.....	1	Fair	Fair	Good	Good
May King.....	1	-do-	Good	-do-	-do-
Lettuce (cos, or romaine):					
Dark Green.....	1	-do-	Fair	Fair	Fair
Paris White.....	1	-do-	Good	Good	Good
Lettuce (crisphead):					
Great Lakes.....	3	Good	-do-	-do-	-do-
Hanson.....	2	Fair	Fair	-do-	-do-
Imperial 44.....	2	Good	Good	-do-	-do-
Imperial 456.....	3	Fair	-do-	-do-	-do-
Imperial 847.....	3	-do-	-do-	-do-	-do-
New York No. 12.....	1	-do-	-do-	-do-	-do-
Lettuce (leaf):					
Early Curled Simpson.....	1	Good	-do-	-do-	-do-
Grand Rapids.....	1	Fair	Fair	Fair	Fair
Lettuce (stem):					
Celtuce.....	2	-do-	Good	Good	Good
Mustard:					
Fordhook Fancy.....	2	-do-	-do-	-do-	-do-
Giant Southern Curled.....	2	-do-	-do-	-do-	-do-
Tendergreen (Mustard Spinach).....	1	-do-	-do-	-do-	-do-
Okra (gumbo):					
Dwarf Green.....	1	Good	-do-	Fair	
Perkins Mammoth Long Pod.....	3	-do-	Fair	Poor	
White Velvet.....	2	-do-	-do-	-do-	
Onions (perennial):					
Japanese Long Bunching.....	1	-do-	Good	Fair	Fair
Multiplier (potato).....	2	-do-	-do-	-do-	-do-
Perennial Tree (Egyptian).....	2	Fair	-do-	Good	Good
Welsh.....	1	Good	-do-	Fair	Fair
Onions (sets):					
Ebenezer.....	3	-do-	-do-	Good	Good
Red.....	3	Fair	Fair	Fair	Fair
White.....	1	Good	Good	Good	Good
Yellow.....	2	-do-	-do-	-do-	-do-
Onions (seed or transplants):					
Early Grano (Babosa).....	1	-do-	-do-	-do-	
Early Yellow Sweet Spanish.....	1	-do-	-do-	-do-	
Mountain Danvers.....	3	-do-	Fair	Poor	
Southport White Globe.....	3	-do-	-do-	-do-	
Yellow Globe Danvers.....	3	-do-	Good	-do-	
Yellow Sweet Spanish (Utah strain).....	2	-do-	-do-	Fair	
Orach:					
Gelbe.....	1	Fair	Fair	-do-	Fair
Green Double Headed.....	1	Good	Good	Good	Good
Triumph.....	1	Fair	Fair	Fair	Fair
Parsley:					
Evergreen.....	2	Good	Good	Good	Good
Hamburg.....	3	-do-	-do-	Fair	
Moss Curled.....	1	-do-	-do-	Good	Good
Paramount.....	3	-do-	-do-	-do-	-do-
Plain.....	1	-do-	-do-	-do-	-do-
Parsnips:					
All American.....	2	-do-	-do-	Fair	
Hollow Crown (Guernsey).....	3	-do-	-do-	-do-	
Short Thick.....	1	Fair	-do-	Good	
Woodruffs Ace.....	2	Good	-do-	Fair	
Peas (smooth-seeded):					
Alaska.....	1	-do-	Fair	-do-	Good
Carters Eight Weeks (Radio).....	1	-do-	-do-	-do-	-do-
Laxtons Superb (Early Bird).....	2	-do-	-do-	-do-	-do-
Peas (wrinkled-seeded):					
Alderman.....	3	Fair	Good	Good	Poor
Bliss Everbearing.....	3	-do-	-do-	-do-	-do-
Champion of England.....	3	-do-	-do-	-do-	-do-
Dwarf Telephone.....	3	-do-	-do-	-do-	-do-
Gradus.....	2	Good	-do-	-do-	Good
Laxtonian.....	2	-do-	-do-	-do-	-do-
Little Marvel.....	2	-do-	-do-	-do-	-do-
Stratagem Improved.....	3	Fair	-do-	-do-	-do-
Telephone.....	3	-do-	-do-	-do-	-do-
Thomas Laxton.....	2	Good	-do-	-do-	-do-
World Record.....	1	-do-	-do-	-do-	-do-

See footnotes at end of table.

TABLE 1.—*Vegetable varieties adapted to different altitude ranges in the central and high Plains and mountain valleys—Continued*

Vegetable and variety	Relative earliness ¹	Rating at altitude of—			
		2,000 to 4,500 feet	4,500 to 6,000 feet	6,000 to 7,000 feet	7,000 feet and over
Peppers (sweet):					
Bull Nose.....	2	Fair	Good	Fair	
California Wonder.....	3	Good	-do-	Poor	
Chinese Giant.....	3	-do-	Fair	-do-	
Early California Wonder.....	2	-do-	Good	-do-	
Golden Queen.....	3	-do-	Fair	-do-	
Harris Early Giant.....	1	Fair	Good	Good	
King of the North.....	2	-do-	-do-	Fair	
Neapolitan.....	1	-do-	-do-	Good	
Ruby King.....	2	Good	-do-	Poor	
Windsor A.....	1	Fair	-do-	Good	
World Beater.....	3	Good	-do-	Poor	
Peppers (pimento):					
Perfection.....	3	-do-	-do-	Fair	
Sunnybrook.....	3	-do-	-do-	-do-	
Peppers (hot):					
Hungarian Yellow Wax.....	1	Fair	-do-	-do-	
Large Cherry.....	3	Good	-do-	Poor	
Long Red Cayenne.....	2	-do-	-do-	-do-	
Popcorn:					
Japanese Hulless (Australian Hulless) ..	1	Fair	-do-	Good	
South American (T.N.T.).....	3	Good	-do-	Fair	
White Rice.....	2	-do-	-do-	-do-	
Pumpkins (winter):					
Cheyenne Bush.....	1	-do-	-do-	Good	
Connecticut Field.....	3	-do-	-do-	Poor	
Early Cheyenne.....	1	-do-	-do-	Good	
Large Cheese (Kentucky Field).....	3	-do-	-do-	Poor	
New England Pie (Sweet Sugar).....	2	-do-	-do-	-do-	
Winter Luxury.....	2	Fair	Fair	-do-	
Radishes (summer):					
Crimson Giant.....	3	Good	Good	Good	Good
Early Scarlet Globe.....	1	-do-	-do-	-do-	-do-
Saxa.....	1	-do-	-do-	-do-	-do-
Sparkler.....	2	Fair	Fair	Fair	Fair
White Icicle.....	3	Good	Good	Good	Good
Radishes (winter):					
China Rose Winter.....	3	Fair	-do-	-do-	Fair
Long Black Spanish.....	3	-do-	-do-	-do-	-do-
Rhubarb:					
Linnaeus (Strawberry).....	1	Good	-do-	-do-	Good
McDonald.....	1	-do-	-do-	-do-	-do-
Victoria.....	2	Fair	Fair	Fair	Fair
Rutabagas (Swedish turnips):					
American Purple Top (Long Island)....	3	Good	Good	Good	Good
Bangholm.....	2	Fair	Fair	Fair	Fair
Early Neckless (Golden Neckless).....	1	-do-	Good	Good	Good
Sweet German.....	2	-do-	Fair	Fair	Fair
Salsify (vegetable-oyster):					
Mammoth Sandwich Island.....	3	Good	Good	-do-	
Spinach:					
King of Denmark.....	2	Fair	Fair	Good	Good
Long Standing Bloomsdale.....	1	-do-	Good	-do-	-do-
Nobel.....	2	Good	-do-	-do-	-do-
Juliana.....	3	-do-	-do-	Fair	Fair
Spinach (New Zealand).....	3	-do-	-do-	-do-	
Squashes (summer):					
Cocozele.....	2	-do-	-do-	Good	
Early Summer Crookneck.....	1	Fair	Fair	-do-	
Early White Bush Scallop.....	1	Good	Good	-do-	
Early Yellow Bush Scallop.....	1	-do-	-do-	-do-	
Giant Summer Crookneck.....	2	-do-	-do-	Fair	
Giant Summer Straightneck.....	2	-do-	-do-	-do-	
Yankee Hybrid.....	1	Fair	Fair	-do-	
Zucchini.....	2	Good	Good	-do-	
Squashes (winter):					
Arikara.....	1	Fair	-do-	-do-	
Banquet.....	1	Good	-do-	-do-	
Blue Hubbard.....	3	Fair	Fair	-do-	
Buttercup.....	1	Good	Good	Good	
Butternut.....	1	-do-	-do-	Fair	
Chicago Warty Hubbard.....	3	-do-	-do-	-do-	
Golden Hubbard.....	1	-do-	-do-	Good	
Improved Green Hubbard.....	3	-do-	-do-	Fair	
Table Queen (Acorn).....	1	-do-	-do-	Good	
Vermont Hubbard.....	2	-do-	-do-	Fair	

See footnotes at end of table.

TABLE 1.—*Vegetable varieties adapted to different altitude ranges in the central and high Plains and mountain valleys—Continued*

Vegetable and variety	Relative earliness ¹	Rating at altitude of—			
		2,000 to 4,500 feet	4,500 to 6,000 feet	6,000 to 7,000 feet	7,000 feet and over
Tomatoes:					
Bison.....	2	Fair	Fair	Fair	
Bonny Best.....	3	Good	Good	Poor	
Bounty.....	2	-do-	-do-	Fair	
Danmark.....	1	-do-	Fair	Good	
Earliana.....	2	Fair	Good	Fair	
Early Chatham.....	1	-do-	Fair	Good	
Millets Dakota.....	2	-do-	Good	Fair	
Red Cloud.....	1	-do-	-do-	Good	
Schells No. 10.....	2	-do-	-do-	Fair	
Sioux.....	3	Good	-do-	Poor	
Speed.....	2	Fair	-do-	Fair	
The Landreth.....	3	Good	-do-	Poor	
Turnips:					
Cow Horn (Long White).....	3	-do-	-do-	Good	Good
Early White Flat Dutch.....	1	Fair	Fair	Fair	Fair
Golden Ball (Orange Jelly).....	3	-do-	-do-	-do-	-do-
Purple Top Milan.....	1	-do-	-do-	-do-	-do-
Purple Top Strap Leaved.....	1	Good	Good	Good	Good
Purple Top White Globe.....	2	-do-	-do-	-do-	-do-
Snow Ball (White Six Weeks).....	2	Fair	Fair	Fair	Fair
White Egg.....	2	-do-	-do-	-do-	-do-
White Milan.....	1	-do-	-do-	-do-	-do-
Yellow Aberdeen Purple Top.....	3	-do-	-do-	Good	Good
Watermelons:					
Arikara.....	1	Poor	-do-	-do-	
Coles Early (Harris Earliest).....	1	-do-	-do-	-do-	
Earliest and Sweetest.....	2	Fair	Good	Poor	
Early Kansas.....	2	Good	-do-	-do-	
Halbert Honey.....	3	-do-	Fair	-do-	
Honey Cream.....	2	Fair	Good	-do-	
Kleckley Sweet.....	2	Good	-do-	-do-	
Luscious Golden Sweet.....	1	Fair	-do-	Good	
Northern Sweet.....	2	-do-	-do-	Poor	
Sweet Siberian.....	1	-do-	-do-	Good	
Winter Queen.....	3	Good	Fair	Poor	
Witloof chicory (French endive).....	3	-do-	Good	Good	
Wonderberries (garden huckleberries).....	1	Fair	-do-	-do-	

¹ Varieties that mature earliest within a particular crop or subgroup of a crop are indicated by 1; those that mature somewhat later, by 2; and those that mature latest, by 3. Each crop and subgroup of a crop is rated independently.

² See Lettuce, stem.

a wider range of vegetables can be grown in this section than in any other part of the region (table 1).

In the western, or high-plains, section altitudes range from 6,000 to 7,000 feet. The average annual precipitation ranges from 20 to 25 inches, but some rather restricted localities may have as much as 30 inches and others as little as 10. Localities with as little as 10 inches for the most part are deserts or non-agricultural land. From 6 to 12 inches of the annual rainfall falls from April to September. The average number of days without killing frost ranges from less than 80 to 100, but in some localities frosts may occur during any month. The average temperatures for June, July, and August range from 50° to 60° F. The average dates of the last killing frost in the spring range from about June 1 in the more easterly part to about June 11 in the western part; the dates of the first killing frost in the fall range from about September 11 in the eastern part to about September 1 in the western. The lower summer temperatures plus the greater rainfall make irrigation less essential for the growing of vegetables in this section than in the two more easterly sections of the region, but even here most crops are benefited by some additional water. However, if early-maturing crops are desired, greater care must be taken in the application of water because of its cooling effect on the soil. In general, only

the earliest maturing varieties should be selected for growing in this section (table 1).

The fourth section of this region is not so well defined as the others. It consists mainly of high mountain valleys, or alpine meadows, distributed throughout the mountainous sections in western Wyoming and west-central Colorado. It is not a continuous belt but is broken near its center by the high-plains section of southern Wyoming. Altitudes range from 7,000 feet to the upper limit at which even the most hardy vegetables can be grown. The average annual precipitation ranges from 25 to 30 inches, of which 12 or more inches falls from April to September. The average frost-free period is often only 80 days, and in some places frosts may occur at any time. The average temperature for June, July, and August is about 50° F. The average date of the last killing frost in the spring is about June 11, and that of the first killing frost in the fall is about September 1. Irrigation is generally beneficial, but it should be limited as much as possible because excess water cools the soil and delays maturity of most crops. In this section only the more hardy crops can be safely grown, but this group is so large that there is no climatic reason why an ample supply of vegetables cannot be grown (table 1).

VEGETABLE VARIETIES ADAPTED TO DIFFERENT ALTITUDES

Each vegetable grower should select crops and varieties suitable to the altitude of his locality. Table 1 will guide him in his selection. After determining what he can grow, each gardener should choose the crops and the varieties that his family likes. He should then adjust the area planted to each to suit the needs of his family. He should not try to grow all crops suited to his locality.

LOCATION OF THE GARDEN

Gardeners in cities and towns usually have little or no choice as to the location of their gardens, but must use any land that is available. Farmers, however, may have several places suitable for gardening.

The most important factor in selecting a location for a farm garden is its convenience for soil preparation and cultivation. Because these are the two largest labor items the garden should be located, if possible, so that the work can be done with standard farm-tillage equipment. Where such equipment is to be used, the garden should be relatively long and narrow to avoid unnecessary turning, and a turning space at least 20 feet wide should be provided at each end.

A suitable location near the house makes planting easier; also more attention can usually be given to such matters as hoeing, irrigation, insect and disease control, and the harvesting of each crop as it reaches the best stage of maturity. Frequently, however, there is not sufficient suitable land available near the house, the land may not have a proper slope, or there may not be enough irrigation water for the entire garden. In such cases it may be advisable to plant at least part of the vegetables in the field with

such farm crops as corn, beans, or potatoes that are grown in rows and tended with standard farm equipment.

In making plans to plant part of the vegetables with the field crops, the grower should remember that certain ones may be attacked by rabbits, ground squirrels, field mice, birds, or other wildlife. Carrots, cantaloups (muskmelons), parsnips, and salsify, for example, are favorite foods for such animals as rabbits and ground squirrels; both popcorn and sweet corn may be attacked by birds. If such wildlife is abundant and some measures cannot be taken to protect the crops, it would be unwise to attempt such a division of the garden.

Soil type is less important than convenience in determining location. Most vegetables make satisfactory growth and yields on a wide variety of soil types; therefore with good management almost any soil suitable for general farm crops can be used for the garden. If the land has never been cultivated, a good stand of grass or even of weeds is evidence that the soil is suitable. Land with a slight slope is preferred to land that is flat. At low altitudes or where high summer temperatures are common, an eastern slope is to be preferred; at altitudes of about 6,000 feet or higher a southern slope is best.

SIZE OF THE GARDEN

If a majority of the rows are spaced 3 to 3½ feet apart, a well-kept ¼- to ½-acre garden should provide an ample supply of vegetables for the average family (two adults and three children). This estimate does not provide for the growing of potatoes. If potatoes are to be grown, additional space will be required. On farms having tillage implements for narrow rows, such as beet cultivators, or for hand-cultivated gardens the distance between rows can be considerably decreased for many crops and the size of the garden area can be reduced proportionately.

A dry-land garden must be considerably larger than an irrigated one if it is to supply an equal quantity of vegetables. The reasons are the lower yield of most vegetables on dry land and the greater distance needed between plants in the rows. The extent of the increase depends largely upon the type of crop; for crops such as beets, for example, the spacings should be about doubled, or the 2- to 3-inch spacings suggested for irrigated gardens should be increased to 4 to 6 inches. For such crops as tomatoes and cabbage, which are normally set rather far apart even under irrigation, a 50-percent increase is sufficient. Very little is to be gained by increasing the distance between rows over those suggested in this bulletin (table 2).

From the preceding discussion it is evident that a dry-land garden for an average family should be one-half to two-thirds of an acre, or twice as large as an irrigated one. An area 100 by 200 feet is equivalent to about half an acre and one 120 by 250 feet is equivalent to about two-thirds of an acre. It is a good practice to locate the dry-land garden on land that has been manured and fallowed the preceding summer. For this reason an area double the size to be planted in any one year should be set aside for the garden.

TILLAGE AND FERTILIZATION

MANURE

Animal manure is the best fertilizer for most vegetables. It should be applied before the ground is plowed or before the duckfoot cultivator is used. Old or well-rotted manure is probably slightly better than fresh manure; at least it does not contain so many weed seeds. From 25 to 30 tons per acre may be applied, the exact amount depending somewhat on the type of soil and the kind of manure. Heavy soils may be more heavily manured than lighter or more sandy types, but as a rule sandy soils require more frequent applications. Manure containing a large percentage of straw should not be used on dry land because the straw rots rather slowly and until it has rotted it tends to make the soil drier; furthermore if it is plowed under, the layer of straw between the furrow slice and the subsoil makes it almost impossible for the plant roots to grow down into the moist subsoil. The portion of the dry-land garden that is to be fallowed should be plowed or worked deeply with a duckfoot cultivator, preferably during May or June.

The land for irrigated gardens may be plowed or worked with a duckfoot cultivator either in the spring or in the fall. Soils that might blow badly during the winter, however, should be prepared in the spring. Manure may also be applied to irrigated land whenever it can be done most conveniently, but it is better not to apply large quantities of it just before the garden is to be planted. Larger quantities may be applied on irrigated land than on dry land; also there may be larger proportions of straw without danger of injuring the plants. However, well-rotted and fresh manures have the same relative merits on irrigated and dry-land gardens.

COMMERCIAL FERTILIZERS

Commercial fertilizers are not commonly used for growing vegetables in this region, and probably their use is not justified on most soils. Moreover, where they are needed a complete fertilizer (one containing nitrogen, phosphorus, and potash) is seldom required. For this reason, when low yields indicate a lack of fertility, the grower should test each of these elements to determine which is needed. Small quantities of each element applied separately should indicate whether it is beneficial to a crop. For a fair test each element should be applied to the same crop on soil of the same type.

Where nitrogen is needed it may be applied as ammonium sulfate, at rates ranging from as low as 50 to 75 pounds per acre up to 250 pounds; however, the higher rate of application probably is not often necessary. Phosphorus, usually as treble superphosphate, may be applied at rates ranging from 50 to 250 pounds per acre, but applications of 100 to 150 pounds generally give maximum returns. Good results have also been obtained from the use of similar quantities of ammonium phosphate, which carries about 10 percent of nitrogen and 48 percent of phosphorus. Potash, as potassium chloride, is usually applied at rates ranging from 75 to 120 pounds per acre.

SOIL AMENDMENTS

The two most commonly used soil amendments are lime and sulfur. Lime should be used only on acid soils to neutralize organic acids and to improve soil structure by making it less dense or compact. Because practically all agricultural soils in this region are either neutral or alkaline in reaction, lime is seldom needed and may even be injurious to vegetable crops.

On the other hand, sulfur is used on neutral or alkaline soils to increase their acidity. In most instances it has not been beneficial to vegetables, and in some cases it has actually been injurious. For these reasons the home gardener should consult his county agricultural extension agent or the soils department of his State agricultural college before using either lime or sulfur on his garden.

CULTIVATION

As a general rule when weeds are not sufficiently numerous to compete seriously with the vegetables for water and nutrients, cultivation is of but little value and may even be harmful. However, very heavy or compact soils must be cultivated occasionally if they are to be used for vegetable growing.

Regardless of its purpose, however, cultivation should always be shallow, preferably not deeper than 2 to 3 inches. Deeper cultivation cuts off the feeding roots, which with most crops lie chiefly in the top 6 inches of soil, and it also reduces soil moisture by turning up the moist soil to the drying action of the sun and wind. Therefore cultivators that destroy weeds by a scraping action, such as the duckfoot cultivator, are to be preferred to those that dig deeper into the soil.

IRRIGATION

In practically all sections of this region irrigation increases both the yield and the quality of most vegetables. Only a few general rules can be given governing the use of water for irrigation, because of the great variety of vegetables grown, the wide range of climatic conditions, and the many soil types. Because the special irrigation requirements of certain crops are discussed under their methods of culture, only the more general rules for irrigation are given in this section.

Sometimes it is necessary to irrigate in order to obtain good stands of plants from seed sown in the open ground. If irrigation is necessary, either the seed is sown close to small furrows previously made or the furrows may be made close to the rows after the seed is sown. In either case a small stream of water is allowed to run through the furrows until the ground around the seed is thoroughly moistened. The water should not be allowed to flood over the seed row, because in many types of soils this causes the formation of a hard crust which prevents emergence of the seedlings. Also flooding the seed row may wash out the seed. It is best, therefore, to depend on natural soil moisture for germination; some experienced gardeners prefer to take chances on the occurrence of rain rather than to run the risks of irrigation.

All transplants should be irrigated as soon as they are set. The water should run through the furrows before the plants are set or through shallow furrows beside the rows after the plants are set. In the former case the plants are set in the wet soil and covered with dry soil from between the rows. Where irrigation is not possible, sufficient water to prevent wilting of the plants should be applied by hand.

The frequency of irrigation should be governed by the appearance of the crop rather than by that of the soil. Because crops vary widely in their needs for water, the common practice of irrigating at regular intervals may benefit some crops but injure others. The fruit-bearing crops, such as tomatoes, peppers, squashes, and cantaloups (muskmelons), for example, should be well irrigated until the fruits have set and started to develop; then the supply of water should be reduced to permit the fruits to ripen more quickly. This rule is not so important in sections having a long growing season or high summer temperatures as in those where the altitude is greater, the growing season shorter, and the average summer temperatures lower. In general it applies to those localities having altitudes in excess of 5,500 to 6,000 feet. On the other hand, the leafy crops, such as lettuce, spinach, and cabbage, and the root crops, such as radishes, beets, and carrots, should be watered frequently throughout the season to keep them growing continuously at their maximum rate. This rule applies almost regardless of altitude or other factors. Some crops, such as sweet corn, provide exceptions to both of these rules; the irrigation requirements are discussed under the culture of each crop.

HOME-GROWN SEEDLINGS

SEEDING

For tomatoes, peppers, eggplant, cabbage, cauliflower, and other long-season crops to make satisfactory yields, the plants must be started indoors and transplanted to the garden after danger of frost is past. Materials useful for sowing and transplanting vegetable plants are illustrated in figures 2 and 3.

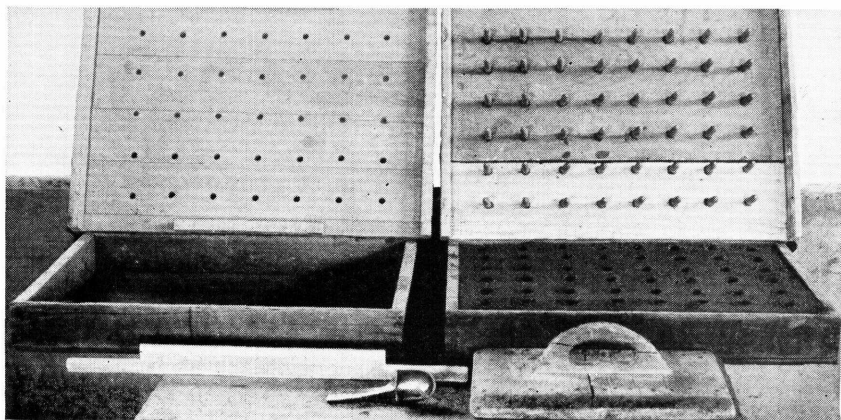


Figure 2.—Equipment useful for seeding and transplanting.

When relatively few plants of each crop are to be grown, as for the home garden, the seed may be sown in shallow boxes, or flats. Any box that is moderately tight and 2 to 3 inches deep is satisfactory. It should be filled within about half an inch of the top with good garden soil. The soil selected should not contain much manure or other organic matter, because organisms that cause seedling diseases may be present in such materials. A sandy soil or a sandy loam is better than a clayey one.

After the soil in the seed flat has been leveled and slightly firmed, narrow rows one-third to one-half inch deep and 2 inches apart should be made to receive the seed (fig. 3). An old but fairly good rule states that the seed should be sown at the rate of about 12 to the inch. However, because onions are not removed from the seed flat until they are set in the garden, it is better to sow not more than 5 or 6 seeds per inch; otherwise the plants will become too crowded in the rows before they are large enough for setting in the garden.

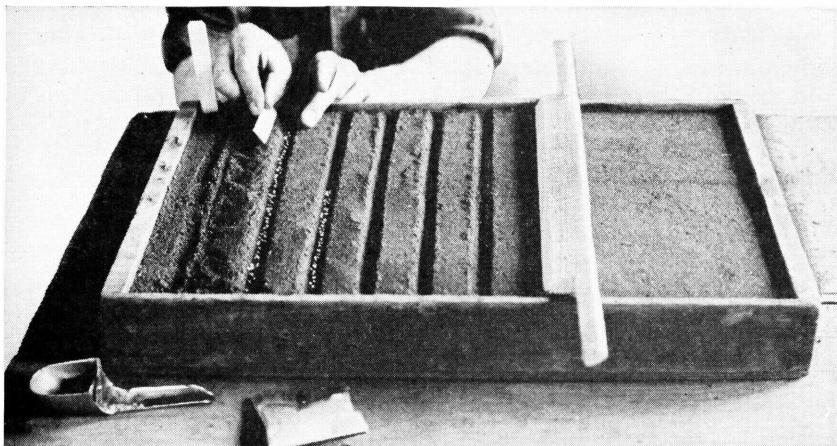


Figure 3.—Method of seeding in flats, or shallow boxes.

After the seed is sown, it should be well watered and the seed box should be placed in a light, warm place until the seed has germinated. During this period it is highly important that the soil surrounding the seed be kept moist at all times, but the surface of the soil must be kept as dry as possible. To accomplish this, all the soil in the box should be thoroughly wet each time water is applied but should not be watered again until watering is necessary to keep the soil around the seed moist. As an aid in keeping the surface of the soil dry, watering should be done in the morning and the seed flat should be placed where it will receive maximum sunlight and a good circulation of air over the surface. Temperatures of 65° to 75° F. are satisfactory for the germination of most vegetable seeds.

The approximate dates for sowing seeds are given under the discussion of the individual crops.

GROWING PLANTS IN HOTBEDS AND COLDFRAMES

Those who need more plants than can be grown conveniently in the house will find a hotbed or a combination of a hotbed and a coldframe useful. Such structures are easily and cheaply built and will last for years.²

The method of growing plants in hotbeds and coldframes is very similar to that used in growing plants in the house, but in most cases slightly more time must be allowed for the plants to grow large enough to be set in the garden. When hotbeds are used, the seed can be sown in rows across one end of the bed; and when the plants are of sufficient size, they can be spotted in the unused portion of the bed. However, many gardeners prefer to start the plants in the house and spot them later in the hotbed. The latter method has two advantages; namely, the temperature can be more easily controlled in the house than in a hotbed and it is easier to attend properly to the watering during the critical period of seed germination.

After the plants are well established in the hotbed, special attention should be given to ventilation as well as to temperature control and watering. However, these topics will not be discussed in detail here because the publications already referred to give instructions on these phases of hotbed management.³

TRANSPLANTING

After the seed has germinated and the young seedlings are showing their first true leaves, they are ready to be transplanted, or spotted, to other containers to give them more room for growth (fig. 4). If boxes are used they should be 3 to 4 inches deep, but fine plants are raised in tin cans, flowerpots, and old saucepans. The important thing during this stage is that the plants be given ample room for development, be set in good fertile soil, and have plenty of sunlight and water. If more than one plant is placed in a container, the plants should be spaced not less than $2\frac{1}{2}$ inches apart; it is even better if 3 inches is left between plants.

Any good garden soil is satisfactory for use, but like that used in the seed flat it should not contain much manure. During this period the plants should have all the sunlight possible; the temperature should never be allowed to drop below 65° to 70° F., because temperatures lower than these cause such plants as celery to bolt, or send up seedstalks prematurely, soon after they are set in the garden. About the best temperature range for most vegetable crops is 65° to 75° , but such crops as tomatoes, peppers, or eggplant will do well at much higher temperatures. Watering during this stage is fully as important as during the time the seed is germinating; therefore the same precautions should be taken to keep the surface of the soil dry and the under-soil moist.

² Most State agricultural colleges or experiment stations issue instructions for the construction of hotbeds and coldframes. See also Farmers' Bulletin 1743, Hotbeds and Coldframes.

³ See footnote 2.

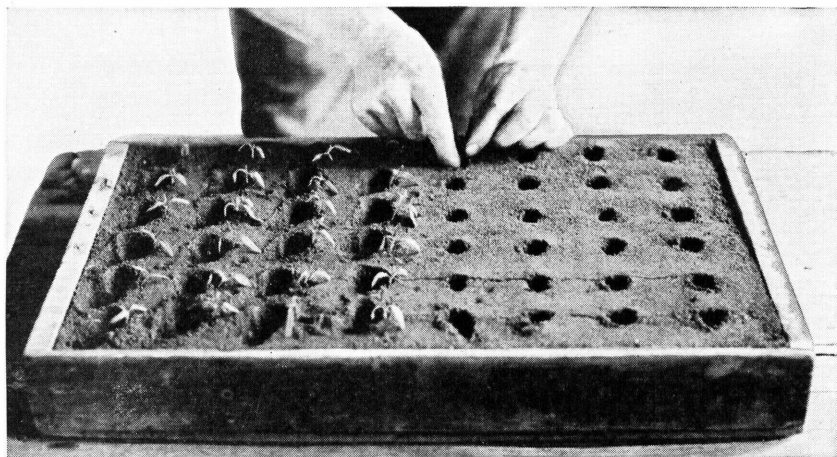


Figure 4.—Method of transplanting, or spotting, vegetable seedlings.

HARDENING

Regardless of how the plants have been started, many growers believe that they should be hardened before they are set in the garden. This is accomplished in several ways, but most commonly by withholding water and gradually lowering the temperature until the plants are somewhat checked in growth.

The reasons given in support of hardening are that the plants become sturdier and consequently less subject to injury from wind whipping, that they become established more quickly in the garden, with consequent earlier and heavier fruiting, and that they are made more resistant to injury from late-spring frost. Investigations have shown that there is little basis for these claims. Although hardened plants appear to be less injured by the wind and to establish themselves more quickly, they actually are no earlier and may even be later in coming into bearing than unhardened plants, or plants that have not been checked in their growth by any of the hardening methods. As for increased resistance to cold, such plants as tomatoes, peppers, and eggplant show very little added resistance after hardening. Others, such as cabbage, cauliflower, and brussels sprouts, although they can be made to withstand temperatures of 27° F., lose their resistance to low temperatures in a few days after they are exposed to normal growing conditions; both the early and the total yield of cauliflower at least may be seriously reduced by hardening.

Because such slight benefits can be expected from hardening and hardening may seriously retard earliness and result in reduced yields, it would seem best to discard this practice in favor of growing the plants continuously and normally from the time they appear above ground until they are set in the garden. This does not mean, however, that tall, spindly plants are desirable, but plants that have plenty of sunlight and are not overwatered will not become tall and spindly.

PRUNING SEEDLINGS BEFORE SETTING

Another common practice among gardeners is pruning back the tops of such crops as cabbage, lettuce, onions, and celery just before they are transplanted to the garden. Recent investigations have shown that there is no advantage in pruning such plants; on the contrary it may greatly delay maturity and reduce total yields.

SETTING PLANTS IN THE GARDEN

In transferring seedlings from boxes or hotbeds to the garden every precaution should be taken to prevent injury to their root systems. If plants have been grown in cans, pots, or similar containers, it is simple to remove them with the soil without disturbing or injuring their roots. It is not so easy, however, to transfer seedlings from boxes, flats, or hotbeds without injuring their root systems. To make it less difficult many gardeners block their plants before attempting to move them (fig. 5). Blocking is done by cutting the soil between the plants with a knife a few days before they are to be moved. The first cutting, usually about 8 to 10 days before the plants are to be set out, is made midway between the rows in one direction only. As soon as the plants have lost all signs of wilting, after 2 or 3 days, a second cutting is made to divide the soil around the plants into equal-sized blocks. After each cutting, the plants should be heavily watered to prevent severe wilting. This practice causes the roots to branch, thus holding the soil together so that the plants can be moved to the garden without loss of roots and with the block of soil intact.

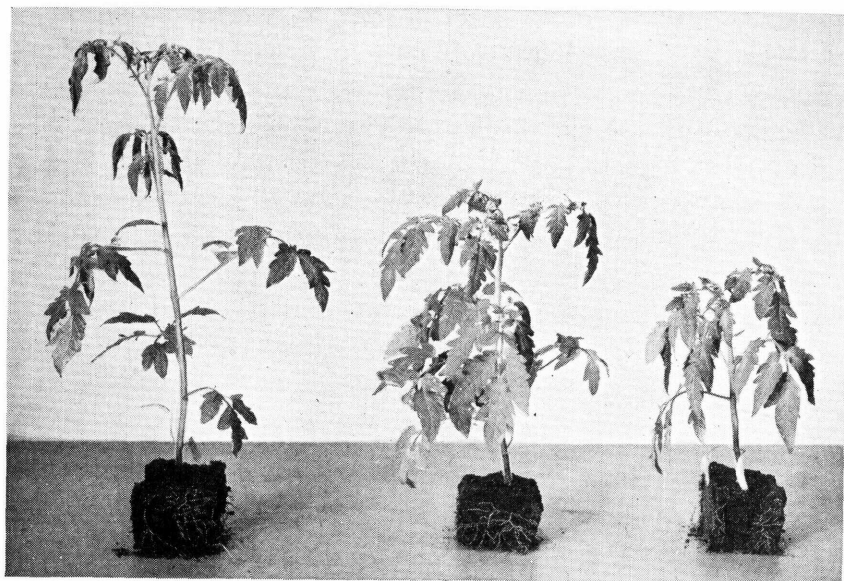


Figure 5.—Tomato plants blocked and ready for setting in the garden.

COMMERCIALLY GROWN SEEDLINGS

LOCALLY GROWN SEEDLINGS

Gardeners living near some towns or cities have an opportunity to buy seedling plants from greenhouses. Such plants should be superior to the average home-grown plants, because greenhouse operators have better facilities for growing them. However, in buying such plants the grower should make certain that he is getting varieties true to name and adapted to his requirements; regardless of how well the plants are grown they are of no value to the gardener unless they are adapted to his needs. This precaution is especially important in buying tomato, pepper, or eggplant seedlings and may be important also in buying those of celery or cauliflower.

An objection frequently made to the use of commercially grown plants is that they may carry disease organisms that will infect the garden area. It is wise, of course, to make certain that the seedlings are not diseased, but it is rather obvious that the commercial grower is just as anxious as the gardener to avoid such diseases, because they would ruin his business. He is far more likely to err in the selection of varieties than in any other respect. For this reason many gardeners furnish the grower with seed of the varieties they wish to grow and pay him to raise plants for them.

SOUTHERN-GROWN SEEDLINGS

Southern-grown seedlings are also available to the home gardener through stores or mail-order houses; although it has been reported that such plants sometimes carry diseases, the main objection to their use is that the varieties are unadapted to the gardener's needs even more frequently than locally grown seedlings. Because the selection of proper varieties is so important in most of the region, the home gardener will do better to grow his own plants according to the simple rules given in this bulletin or to purchase them from local sources so that he will be more certain as to the varieties he is buying.

PLANT PROTECTION

PAPER MULCHES

The question is frequently raised as to the value of paper mulches in raising vegetables. Several research workers have investigated the subject. Although their results do not always agree, some of their more important conclusions may be summarized as follows: In years of normal rainfall and temperatures, paper mulches, especially the black-paper types, usually increase earliness and yields with such crops as tomatoes, peppers, eggplant, and cucumbers that respond favorably to heat. Occasionally, however, earliness and yields are not increased, and in some cases harmful effects have been noted. With vegetables such as cabbage, peas, and root crops, which thrive best under comparatively cool temperatures, the use of paper mulch is even less likely to prove beneficial. In general, it seems doubt-

ful that the increases obtained are sufficient to pay for the cost of the paper except with such crops as tomatoes that have a relatively high value. Gardeners who wish to use paper mulch are advised to try it on a small scale and make their plantings so that at least half of each crop is under ordinary, clean cultivation, in order that they may be able to measure its value for themselves.

PROTECTORS

Plant protectors, sometimes known as frost protectors, are made of a wide variety of materials, including various types of paper, pasteboard, glassine, cheesecloth, and glass. Their main function is to protect the plants against frost in early spring, but they also afford some protection against insects and wind damage. Their use makes it possible to seed or to set out certain crops earlier in the spring than would otherwise be safe, and the better types of protectors increase earliness and yields by providing better growing conditions for the young plants. Crops most likely to benefit from their use are tomatoes, peppers, eggplant, cantaloups, watermelons, squashes, and pumpkins.

Under conditions of intense sunlight, temperatures under plant protectors may rise so high as to cause injury to the plants. Moisture may also condense on the inner surface of the protectors, thus destroying their usefulness. To avoid these dangers the protectors should be either tilted or cut to admit cooler air to the plants and to permit the escape of excess moisture. It should also be remembered that plants grown under protectors become tender and may be injured by sun and wind if the protectors are suddenly removed. More ventilation should be given to the plants as the time approaches for the complete removal of the protectors so that the plants will become adjusted to outside conditions.

SUMMER USE OF HOTBEDS AND COLDFRAMES

In sections having short growing seasons, hotbeds and coldframes make convenient places in which to grow tender crops such as tomatoes and melons. Essentially the same care is given to the crops as when they are grown in the open ground, but more attention must be given to watering and the sash must be entirely or partly removed during the warmer part of each day so that the plants will not be injured by high temperatures. Use of sash to prevent injury from low temperature on cold days and at night makes it possible to grow tender crops in sections where they could not be grown in the open ground.

CONTROL OF INSECTS AND DISEASES

Instructions for the control of insects and diseases in the garden cannot generally be given in this bulletin, but they can be obtained elsewhere.⁴ Tomato psyllid and squash bugs are discussed under the crops concerned.

⁴ See Miscellaneous Publication No. 605, *A Vegetable Gardener's Handbook on Insects and Diseases*. Nearly all State agricultural colleges also have bulletins giving instructions for the control of insects and diseases.

TABLE 2.—Planting instructions for vegetable crops, including average time from seeding or plant setting to edible maturity, number of feet of row space required by the average family¹ and quantity of seed or number of plants required

Crop	Time to maturity	Quantity of seed required	Number of plants, roots, or clusters	Depth of planting	Irrigated				Dry-land		
					Row lengths for 5 persons ²	Distance between rows		Distance between plants in rows or hills	Row lengths for 5 persons ²	Distance between rows	Distance between plants in rows or hills
						Power cultivation	Hand cultivation				
					Feet	Inches	Inches	Inches	Feet	Inches	Inches
Asparagus.....	Days 2-3	.....	48 roots	Inches 6-8	96	36-42	36	24	144	72-84	36
Beans:											
Bush (snap or shell).....	60-85	2-3 pounds	.....	2	200-300	36-42	24	3-4	300-450	36-42	4-6
Pole (snap or shell).....	70-95	1/4-1/2 pound	.....	2	50-100	72-84	36	4 36-42	75-150	72-84	4-6
Bush lima.....	75-100	1 pound	.....	2	100	36-42	24	3-4	150	36-42	4-6
Pole lima.....	90-115	1/2 pound	.....	2	50	72-84	36	4 36-42	75	72-84	4-6
Beets.....	65-80	1 1/2-2 ounces	.....	1 1/2	100-150	36-42	15-18	2-3	200-300	36-42	4-6
Broccoli (sprouting).....	60-85	1 packet	6-12 plants	5/8	12-24	36-42	24	24	18-36	36-42	36
Brussels sprouts.....	100-120	1 packet	12-24 plants	(5)	24-48	36-42	24	24	36-72	36-42	36
Cabbage.....	60-110	1 packet	50-75 plants	(5)	100-150	36-42	24	24	150-225	36-42	36
Cantaloups (muskmelons).....	83-114	1 1/4 ounce	.....	1 1/2-1	50	72-84	60	24-36	75	72-84	36-42
Carrots.....	63-77	1 1/2 ounces	.....	1 1/2	150	36-42	15-18	2-3	300	36-42	4-6
Cauliflower.....	55-75	1 packet	24 plants	(5)	48	36-42	24	24	72	36-42	36
Celeriac.....	110-125	1 packet	48-60 plants	(5)	24-30	36-42	24	6	36-45	36-42	9
Celery.....	110-130	1 packet	48-72 plants	(5)	24-36	36-42	24	6	36-54	36-42	9
Chard (Swiss chard).....	55-65	1/4 ounce	.....	1 1/2	25	36-42	18-24	6	50	36-42	12
Chives.....	70-90	1 packet	.....	1 1/2	24-48	36-42	18-24	12-24	36-72	36-42	18-36
Chinese cabbage.....											
Plants:											
Seeds.....	60	.....	10 clusters	(5)	5	36-42	15-18	6	10	36-42	12
Collards.....	80-100	1 packet	.....	1 1/2	5	36-42	15-18	6	10	36-42	12
Corn (sweet).....	80-120	1/4-1/2 ounce	24-48 plants	(5)	48-96	36-42	24	24	72-144	36-42	36
Cucumbers.....	60-80	3/4-1 1/2 pounds	.....	2	300-600	36-42	36	12(4 36)	450-900	36-42	18(4 54)
Eggplant.....	85-100	1/2 ounce	.....	1	36-48	72-84	48	18-24	54-72	72-84	24-36
Endive.....	75-97	1 packet	12-24 plants	(5)	24-48	36-42	24	24	36-72	36-42	36
Horseradish.....	6 125	1 packet	.....	1 1/2	24	36-42	18-24	12	96	36-42	18
Jerusalem-artichoke.....	100-125	2-3 quarts	15-20 roots	3-4	15-20	36-42	36	12	22-30	36-42	18
Kale.....	60-90	2-3 quarts	.....	4 5	50-75	36-42	36	24	75-115	36-42	36
Kohlrabi.....	70-80	1/4 ounce	.....	1 1/2	30-60	36-42	20	12	45-90	36-42	18
.....		1/2 ounce	.....	1 1/2	30-60	36-42	18-24	6	45-90	36-42	9
Leeks.....	6 140-160	1 packet	.....	1 1/2	12	36-42	18	4	18	36-42	6

CULTURE OF INDIVIDUAL VEGETABLES

In table 2 are summarized spacing and other planting data for specific vegetables grown under irrigation and on dry land. The periods from seeding or setting to maturity are also given. The row length suggested for each crop should supply a family of five with a sufficient quantity of it if it is the only crop of the kind grown. The grower who wishes to grow two or three kinds of greens, for example, should plant only a half or a third of the suggested row length of each.

ASPARAGUS

Asparagus, an ideal perennial for home gardens in this region, will survive without protection in all sections (table 1). It is very tolerant to high salt concentrations in the soil and thrives in soils too saline for many other vegetables. It is one of the first vegetables available in the spring and has a production period of 6 to 8 weeks. Finally, it is easily canned for winter use, holds its flavor, color, and texture better than most other vegetables, and is also well adapted to quick freezing. For most people its only drawback is that 2 or 3 years must elapse between the setting of a bed and the time production starts. A well-established bed, however, will last 15 to 20 years.

Raising the Crowns

An asparagus bed can be started either from seed or from crowns; the latter are preferred because harvesting can begin 2 years after they are set, whereas 3 years is required to start a bed from seed.

To start a bed from seed, the gardener should sow the seed early in the spring in what may be called a nursery row. It should be sown in a narrow, shallow furrow in moist soil and covered to a depth of about 1 inch. The rate of seeding should be such that the plants will stand 3 to 4 inches apart in the row to give them ample room to develop. Germination can be hastened by soaking the seed in water for 3 to 5 days at a temperature of 75° to 90° F. Ordinary culture, such as thinning the plants, controlling the weeds, and watering, is all that is required during the first summer (fig. 6, A); the plants should be left in the nursery row over winter. The following spring the crowns are dug and should be set at once in their permanent location. Only the largest and best crowns should be selected for setting. To obtain an ample number of suitable crowns at least twice, and better still three times, as many plants should be grown as will be required for the permanent bed. The small crowns should be discarded. Figure 6, B, shows a well-grown 1-year-old crown suitable for setting in the permanent bed.

It will be noted that a year is required to grow crowns for setting in the permanent bed, whereas crowns like that shown in figure 6, B, ready for immediate setting, can be purchased from many seed houses and nurseries.

Planting the Permanent Bed

The permanent asparagus bed should be located where it will not be disturbed for 15 to 20 years and will not interfere with work on the annual garden. Preferably the bed should be located

on a light soil free from rocks and where the soil will warm up early in the spring. Before the crowns are set the soil should be thoroughly prepared to a depth of at least 8 inches. Unless the soil is already well supplied with organic matter, a liberal application of animal manure should be thoroughly worked into the soil to the depth to which the crowns are to be set. It is better if this can be done the year before the setting of the crowns. Forty-eight crowns should produce sufficient asparagus for an average family.

In preparation for setting the crowns, furrows or trenches 8 to 10 inches wide and 6 to 8 inches deep should be dug where the crowns are to be set. These should be spaced 36 to 42 inches apart on irrigated land and 72 to 84 inches apart on dry land (table 2).

The crowns should be set in the bottom of the trench with the root system spread out as much as possible. They should be

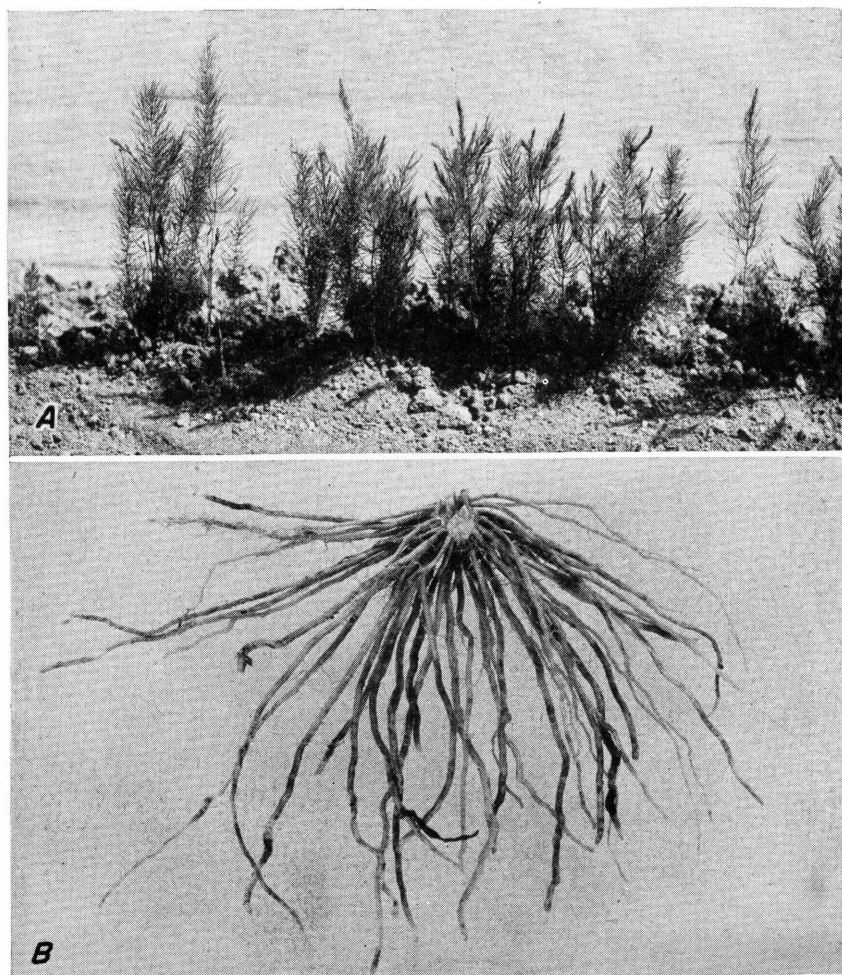


Figure 6.—A, Asparagus seedlings after first season in nursery row; B, well-grown asparagus crown ready for setting in permanent bed.

spaced about 24 inches apart on irrigated land and about 36 inches apart on dry land, covered with 2 or 3 inches of soil, and, unless the ground is well supplied with moisture, watered immediately. The trench should be filled gradually as the plants develop until by late fall it should be completely filled. After the plants are well established they will do well on dry land without further watering, but the bed should be kept free from weeds and the tops left on the plants over winter to catch the snow. Where irrigation is possible, the yields will be improved by three or four applications of water; most of the water should be applied during the early part of the season or during the harvesting period.

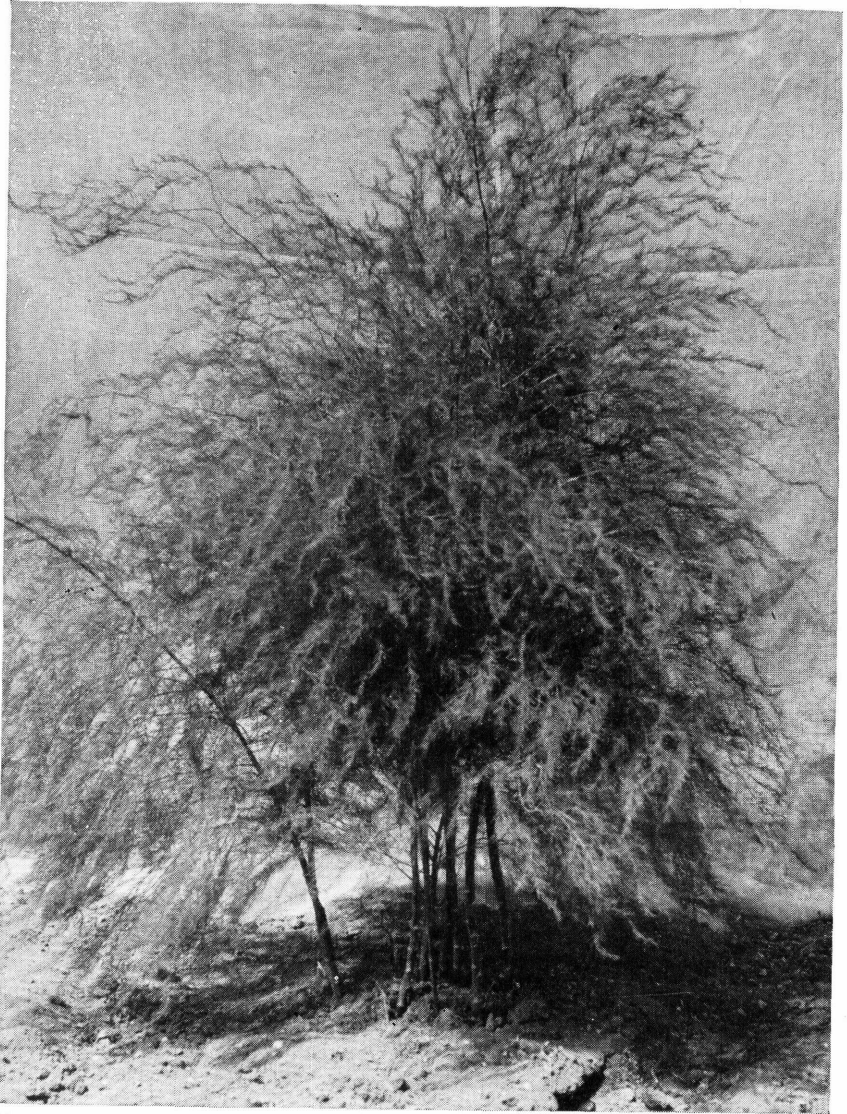


Figure 7.—Single plant of Mary Washington asparagus showing growth made during the summer after the harvest period.

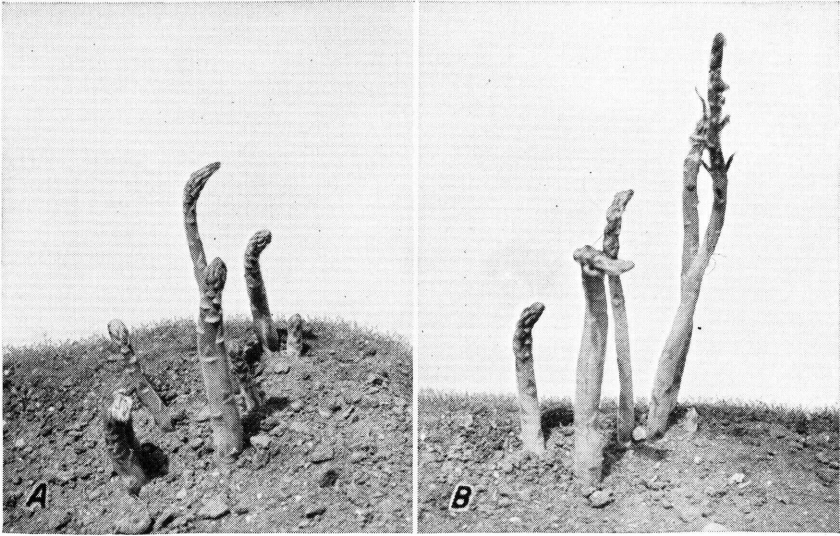


Figure 8.—A, Asparagus spears at right height for cutting; B, asparagus spears starting to branch and past the best cutting stage.

Harvesting

No harvest should be made until the second year after the crowns are set, and even then the harvest should be limited to a 2-week period. Beginning with the third year, the harvest period may last 6 to 8 weeks, but never beyond the middle of July. After the harvest period the tops of the plants should be allowed to grow naturally during the rest of the summer (fig. 7). It is a good practice to leave them on the plants over winter.

The actual cutting of asparagus can be done with a butcher knife or with a special asparagus knife. The spears are cut off 1 or 2 inches below the soil surface as soon as they reach a height of 6 to 12 inches. Figure 8, A, shows spears at the proper stage for harvesting and figure 8, B, those too large; the latter would be tough or woody.

Varieties

Mary Washington is the only asparagus variety that can be fully recommended at the present time. It is vigorous and rust-resistant and produces large yields of high-quality spears. Some people prefer the Martha Washington variety; although it too is rust-resistant, it is generally considered less desirable. A new variety, Paradise, has not yet been sufficiently tested in this region to determine its value.

BEANS (SNAP)

Snap beans can be successfully grown in practically all sections of the region up to altitudes where summer frosts are of frequent occurrence (table 1). At such elevations their culture is hardly worth while, because they are very tender and easily killed by frost. They thrive on a wide variety of soil types, but for early crops or at a higher elevation the lighter, more sandy types are best. At low elevations or where high summer tem-

peratures prevail the heavier types of soils can be expected to favor higher yields, but beans should never be planted on heavy clays or on soils that are waterlogged. Beans are also sensitive to alkali in soils; therefore, they should not be planted on soils known to be alkaline.

Culture and Harvest

Beans should be planted in the spring as soon as the ground is in good working condition but not more than 3 to 5 days before the average date of the last killing frost. For general planting instructions, number of days from planting to harvest, and quantity of seed to sow see table 2.

Succession planting is sometimes advised to prolong the harvest season. In this region, however, late plantings are often unsuccessful; it is better to plant both early- and late-maturing varieties at the regular planting time.

Beans should never be cultivated when their leaves are wet; under such conditions diseases may be spread from diseased to healthy plants. Because beans are shallow-rooted, cultivation should be shallow to avoid breaking the roots.

Beans are well adapted to dry-land culture; yields of 5 to 6 tons per acre have been obtained under dry-land conditions at the Cheyenne Horticultural Field Station. However, even one or two irrigations increase yields, improve quality, and prolong the harvest season. Water is best applied when the plants commence to bloom and during the harvest period.

Snap beans should be harvested when the pods are immature and tender, or before the beans make any considerable growth in the pods. At this stage they are at their maximum quality, and the frequent pickings necessary to obtain pods of this type tend to prolong the bearing period. Snap beans quickly lose their delicate flavor after being harvested. They do not keep well in common storage, but the storage period can be lengthened by keeping them where it is cool and moist. They are well adapted to quick freezing and are one of the most popular vegetables for preservation by this method and by canning.

Varieties

Green-podded, bush varieties of snap beans that can be recommended for this region are Tendergreen, Bountiful, Giant Stringless Green Pod, and Landreth strain of Burpee Stringless Green Pod, U. S. No. 5 Refugee, and Idaho Refugee.

Tendergreen (New Stringless Green Pod) is an early-maturing, productive variety having long, round, dark-green, fleshy, stringless pods of high quality. Giant Stringless Green Pod is also an early-maturing, productive variety; its chief defect is that the beans develop early in the pods, making the pods rather rough appearing or constricted between the beans as they approach maturity. It has long, round, light-green, fleshy, stringless pods of high quality and with a distinctive, pleasing flavor. Burpee Stringless Green Pod is another early-maturing, productive variety somewhat similar to Giant Stringless Green Pod. The Landreth, an improved strain, is preferred to the older type. It produces medium-length, nearly round, light-green, fleshy, stringless pods of high quality. Bountiful is an early-maturing,

productive variety with long, flat, light-green, stringless pods of good quality; however, because its pods become fibrous as they approach maturity they must be picked when young for best quality. U. S. No. 5 Refugee is a late-maturing, productive variety highly resistant to common bean mosaic. It produces medium-length, round, straight, light-silver-green, fleshy, stringless pods of high quality. It is of special value for planting with early-maturing varieties to prolong the harvest season and because of its ability to set pods under hot, dry conditions when many other varieties are unproductive. Idaho Refugee is a very similar variety, also resistant to bean mosaic.

Of the varieties described, Tendergreen, Giant Stringless Green Pod, and Burpee Stringless Green Pod are especially well suited to canning and freezing.

Yellow, or wax-podded, bush varieties of snap beans that can be recommended for this region are Pencil Pod Black Wax, Sure Crop Wax, and Round Pod Kidney Wax (Brittle Wax).

Pencil Pod Black Wax is an early-maturing, productive variety having long, round, attractively yellow, fleshy, stringless pods of highest quality. Sure Crop Wax is an early-maturing, productive variety having medium-length, flat, thick, yellow, fleshy, stringless pods of good quality. The pods are slightly fibrous when mature and should be picked when young for best quality. Round Pod Kidney Wax (Brittle Wax) is an early-maturing, fairly productive variety having medium-long, round, medium-yellow, fleshy, stringless pods of very best quality. It is not quite so productive as Pencil Pod Black Wax or Sure Crop Wax, but it is popular because of its high quality.

Green-podded, pole varieties of snap beans that can be recommended for this region are Blue Lake Stringless and Kentucky Wonder. Blue Lake Stringless is 15 to 20 days later than the early-maturing, bush-type snap beans, but it is in season with U. S. No. 5 Refugee. It is very productive and, like all pole beans, is economical of garden space in producing a given quantity of beans. Its pods are round, long, dark green, fleshy, stringless, and of fine quality. Kentucky Wonder (Old Homestead, Texas Prolific) is perhaps the most popular of all pole snap beans. It matures at about the same time as Blue Lake Stringless. Its pods are long, thick, almost round, medium green, stringless if harvested when young, and fleshy and have a distinctive, pleasing flavor.

Pole beans are not recommended for general culture at altitudes exceeding 6,000 feet.

BEANS (SHELL)

Several kinds of beans are used for green shell beans. These include bush, pole, and lima types (table 1).

Of the bush varieties used mainly as shelled beans, the most popular are Dwarf Horticultural (Speckled Cranberry) and French Horticultural. Dwarf Horticultural is the more popular and seems better adapted to this region. Its pods are green when young, but splashed with carmine at maturity. They are thick, flat, and fairly free from strings, but somewhat fibrous. At the green shell stage the beans are pinkish and spotted and streaked with maroon. This variety is also sometimes used as a snap

bean. French Horticultural is very similar to Dwarf Horticultural, but because the pods are more stringy and fibrous they are seldom used as snap beans.

London Horticultural (Horticultural Pole, Wrens Egg) is probably the most popular pole variety used mainly as a green shell bean. It is a good climber and prolific. The pods are flat and dark green and are splashed with red. Because they are stringless and very fleshy, they are sometimes used as snap beans. The beans are relatively large and buff-colored and are splashed with dark red.

Green shell beans are ready for use 10 to 15 days later than the early varieties of snap beans. The varieties recommended for use as shell beans are sometimes used in making chile con carne or for baking.

Lima beans are prized by many people for use as green shell beans. Their culture is similar to that of snap beans, except that the seedlings are more sensitive to cool weather. Because of this fact the seed cannot be sown without danger of rot in the spring until the temperature of the soil is approximately 50°F. This may be 1 to 2 weeks later than the date of seeding snap beans.

No variety of either the bush- or pole-type lima beans has been found that will consistently produce beans of the green shell stage at altitudes of 6,000 feet or more. In occasional years varieties such as Early Baby Potato, Fordhook Bush, Henderson Bush, Jackson Wonder, and Peerless will produce beans of sufficient size to be used for shelling green. At lower elevations and in the more southerly part of the region both bush and pole limas will mature satisfactorily. The previously mentioned varieties are satisfactory bush types for such localities. Florida Butter, King of the Garden, and Sieva (Carolina) are good varieties of pole limas which may be grown successfully.

The best stage for harvesting green shell lima beans is when the seeds reach their full size in the pods, but before they begin to mature or become hard.

BEETS

Table beets can be grown successfully in all of the region to which this bulletin applies (table 1). By selection of suitable varieties they can be made available for use throughout a large part of the growing season and by proper storage throughout the winter. In many parts of the United States the tops of table beets, which are of excellent quality and have a distinctive flavor, are very popular for use as greens.

Culture

Beets are seeded directly in the garden as early in the spring as possible. The plants are hardy and will usually withstand light frosts; so they may be planted somewhat earlier than many other vegetables. Because the so-called beet "seed" is actually a fruit, or seed ball, that contains two to five seeds, thinning of the plants is necessary regardless of the rate of seeding. Difficulty is often encountered in obtaining even distribution of the beet "seeds," especially if a small planter is used, because they have a tendency

to adhere to each other and fall in bunches. For home gardens perhaps the most satisfactory method of planting is to open a small furrow with a hoe and seed by hand (table 2).

When the plants are 2 to 3 inches in height they should be thinned to stand 2 to 3 inches apart in the row. Cultivation should be done only to control weeds and should be as shallow as possible.

Beets will grow fairly well on dry land; but if the soil becomes very dry for a long period, the roots become woody and lose much of their quality. However, if only one or two irrigations can be given during the period when root formation is taking place, roots of high quality can be produced.

In locations having a short, cool growing season one planting is usually sufficient to produce a continuous supply of roots; in locations with a longer season and comparatively high summer temperatures, several plantings can be made if desired.

Harvest and Storage

Harvesting may be done at any time, depending largely upon the size of roots desired. In harvesting beets, the tops should be cut off about 1 inch above the crown of the roots; this prevents bleeding of the roots, or loss of color, while they are cooking. This precaution is especially important when roots are being harvested for winter storage.

Several methods may be used for home storage of beets and similar vegetables. The most satisfactory one for small quantities is cellar storage. If the temperature of the cellar can be kept between 32° and 45° F. and the humidity fairly high, roots can be stored successfully in open bins or other containers for a considerable length of time. However, if a large quantity of roots is to be stored, the most satisfactory method is to store them in sand. Barrels, boxes, or open bins may be used; the usual procedure is to alternate layers of sand and roots to any depth desired. Stored in this manner, the roots can be kept firm and their quality preserved throughout the winter.

Root vegetables are often stored in outside mounds or trenches. This method is less desirable than cellar storage, but where a cellar is not available it may be used to advantage. The soil is leveled off in some well-drained, sheltered spot and the roots are piled to a depth of 2 to 4 feet. A layer of straw is placed over the entire mound and then a 6- to 10-inch layer of soil is placed on the straw. Additional layers of straw and soil should be added if there is danger of the roots freezing. A small opening is usually left at the top of the mound for ventilation. When severe freezing weather arrives, this opening should be covered with straw and soil to prevent freezing of the vegetables. The mounds may be of any size; but it is more satisfactory to make several small ones rather than one large one, because a small one may be opened and the roots removed for use over a period of a few weeks without exposing a large number of roots. Storing in mounds has the disadvantage that the roots are not always readily available for use.

Varieties

Probably Detroit Dark Red is the most desirable variety of beet for the home garden. Roots of the better strains of this

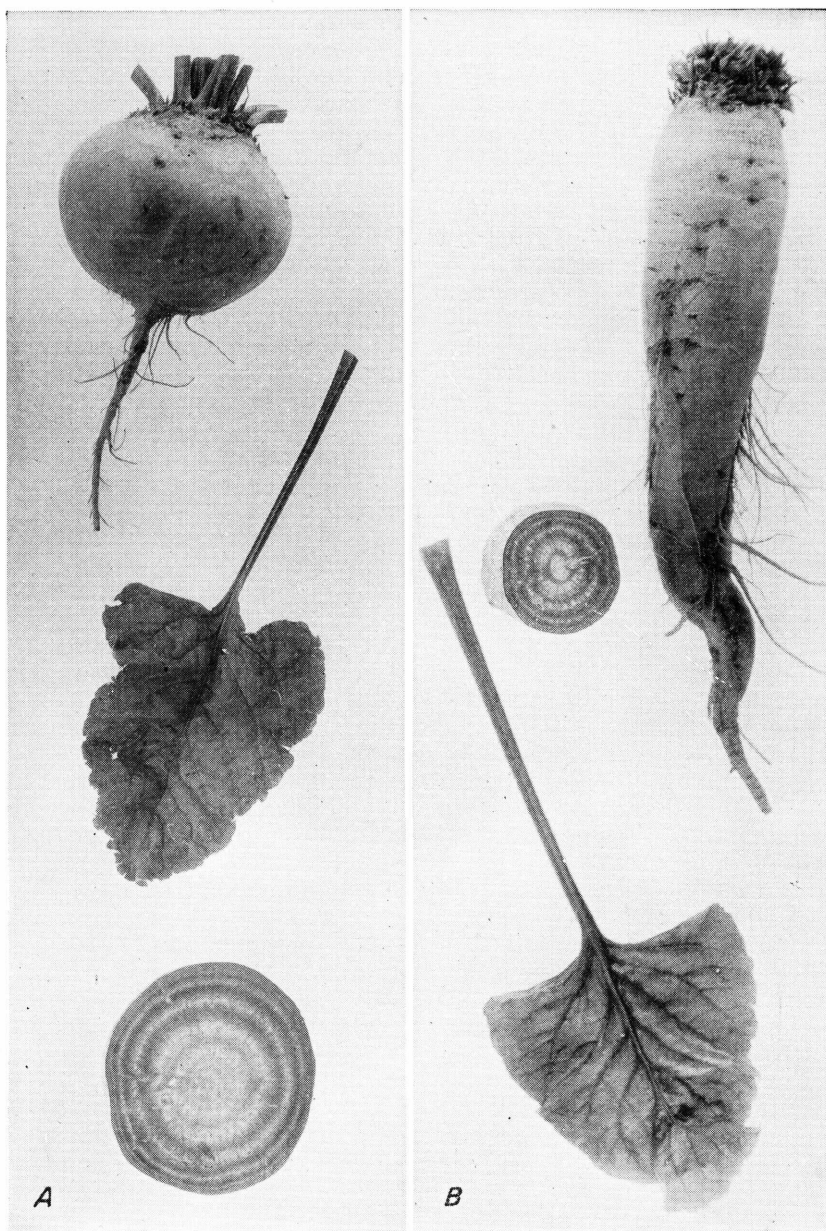


Figure 9.—Roots and leaves of two types of table beets: A, Round type; B, half-long type.

variety are uniformly globular and dark crimson, with narrow, inconspicuous lighter colored zones in the interior. Asgrow Wonder and Crosby Egyptian can also be recommended. These are typically flattened globes and are often lighter colored both on the outside and on the inside than Detroit Dark Red; however, they are somewhat earlier in maturity.

All of these varieties can be stored for winter use if they are planted at such a time that they will be of proper size when they are harvested in the fall. Small to medium-sized roots are best for storage, and only those that are well-shaped and smooth are desirable. Although not usually grown commercially, the half-long- and long-rooted varieties are excellent for storing. By many people they are considered to be of better quality than the globe-shaped varieties (fig. 9). A variety of this type which can be recommended is Long Smooth Blood Red. The roots are 10 to 12 inches in length and approximately 2 inches in diameter at the crown. They mature late in the season and keep well in storage.

BROCCOLI (SPROUTING BROCCOLI)

The type of broccoli known as sprouting, or Italian, broccoli is the only one that can be recommended for this region (table 1). This type produces a relatively large, compact, central head which at the time it is ready for harvest consists of closely grouped flower buds (fig. 10, A). After this head has been harvested, smaller heads develop from side branches, providing a succession of heads over a long period or until the plant is killed by freezing (fig. 10, B). Figure 11 shows typical side, or branch, heads as they appear after harvest. Harvesting of either the central head or of those on the side branches should be done before the flower buds show any signs of opening. Broccoli will not keep in common storage, but it is suitable for preservation by freezing.

Culture and Harvest

Because broccoli requires a rather long growing season, the plants are started indoors in this region by the method described on page 15. Seed should be sown 6 to 8 weeks before the average date of the last killing frost, but as broccoli is not injured by light frosts the plants can be set in the garden as soon as danger of severe frosts is past (table 2). The plants should be watered as soon as possible after they are set. Broccoli will do fairly well on dry land, especially on the heavier types of soils, but better yields of somewhat higher quality are obtained where it is possible to give it two or three irrigations.

The first harvest from broccoli is obtained by cutting out the central head of the plant. As previously stated, this should be cut before the individual flower buds show signs of opening. It should include 3 to 4 inches of the central stalk of the plant. In a few days after this central head is harvested, smaller heads will be formed at the ends of side branches. These may be harvested as described for the central head; a portion of the stalk or branch is cut off with each head.

Varieties

There are not great differences among varieties of broccoli, but one sold under the name of Christmas Calabrese (Calabrese) has proved very dependable in this region. A comparatively new variety, Freezers Sprouting Green, has been developed for a high production of the smaller, or branch, heads. Such heads are especially desirable for preservation by quick freezing.

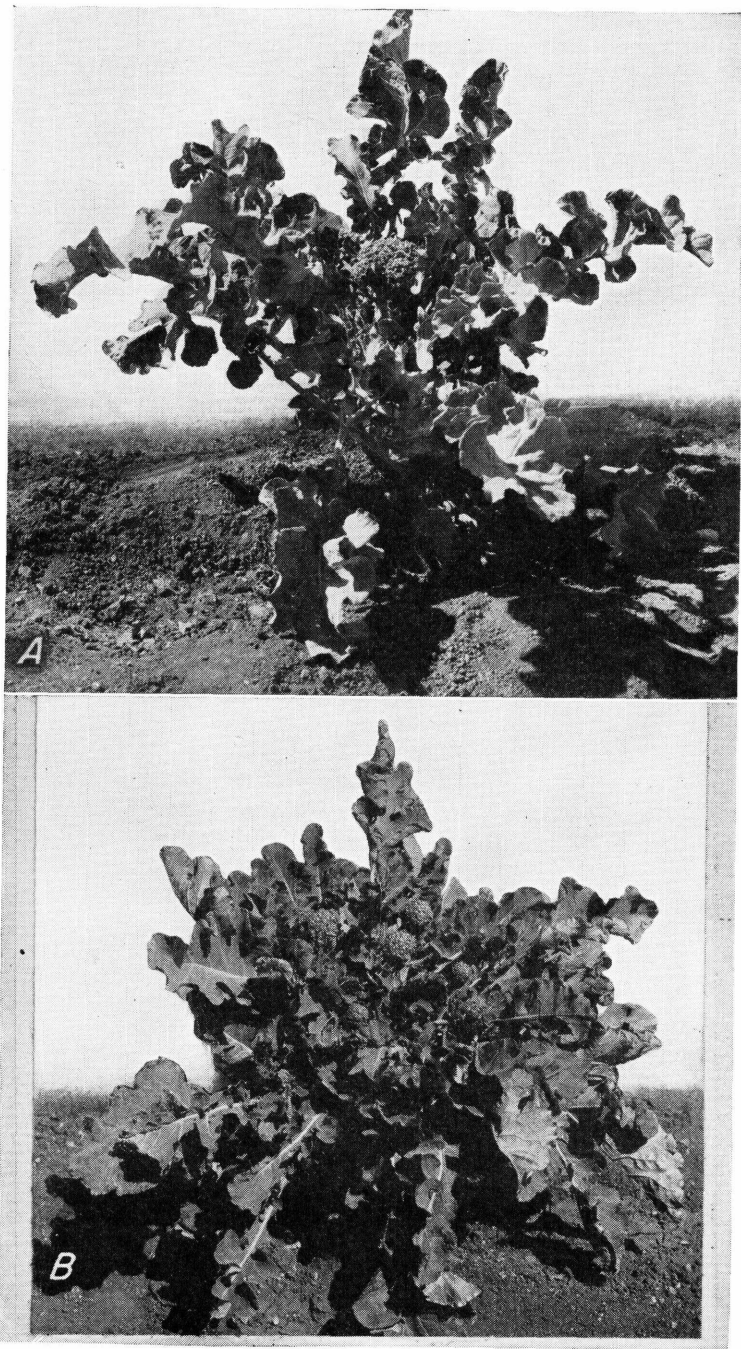


Figure 10.—Broccoli plant: *A*, With large central bud cluster, or head, ready for harvest; *B*, with smaller heads formed on side branches after central head was cut.

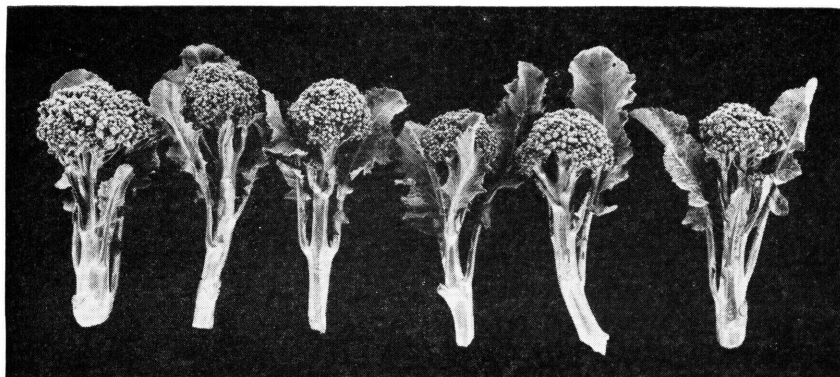


Figure 11.—Small lateral heads of broccoli trimmed for use.

BRUSSELS SPROUTS

Brussels sprouts, which belongs to the cabbage family, is grown for the small, cabbagelike heads, or sprouts, which form in the axils of the leaves along the main stem of the plant (fig. 12). These sprouts are cooked or pickled in the same manner as cauliflower. Many people consider this the most delicious of the cabbage family.

Culture, Harvest, and Storage

Brussels sprouts requires practically the same culture as cauliflower. The plants are started indoors about 6 weeks before they are to be set in the garden, when danger of killing frost is past (table 2). Because brussels sprouts is a shallow-rooted crop, cultivation should be shallow and irrigation should be ample to keep the plants growing vigorously at all times. It is not well adapted to dry-land culture.

The crop makes its most rapid growth in the fall, when the weather is cool; it may be expected to succeed best in sections having altitudes of 5,500 feet or more. During September or early October, depending on climatic conditions, the sprouts should attain diameters of 1 to 1½ inches and become solid, those near the base of the plants being the first to mature.

Harvesting is accomplished by removing the leaves below the sprouts and snapping or cutting the sprouts from the stem. Harvesting the lower sprouts as they mature seems to hasten the maturity of those farther up the stem. The sprouts will stand relatively heavy frosts but should not be allowed to freeze if they are to be stored for winter use. If there is danger of heavy frosts before all the sprouts have been harvested, the plants may be pulled, stripped of their leaves, and stored in a cool cellar or stood upright and close together on the ground, where they can be covered with hay or straw for protection. Freezing does not injure them if they are thawed out slowly, but alternate freezing and thawing spoils them.

Varieties

Long Island Improved (fig. 12) is the variety most commonly listed by seedsmen, and perhaps it is the best variety that can

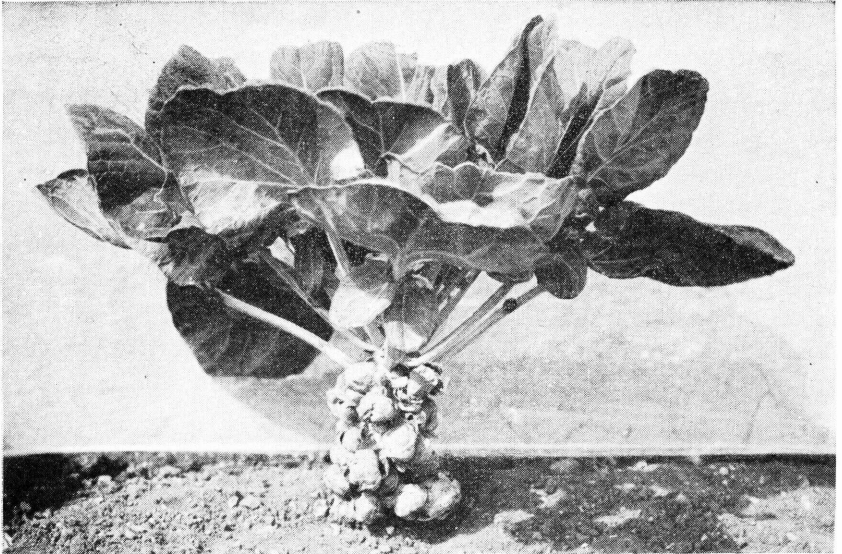


Figure 12.—Plant of Long Island Improved brussels sprouts with leaves stripped, showing small heads, or sprouts, ready for harvesting.

be obtained. However, there is such a difference between strains in ability to produce that only the very best seed is worth purchasing. Other varieties or strains that have yielded fairly well are Improved Dwarf, Oregon Special, and Perfection (table 1).

CABBAGE

Cabbage is a popular and important crop in many home gardens. Although it is plentiful and usually moderately priced in the fall, it is not in such ample supply in summer. Having it always available for use is a great convenience. For the average family 12 to 24 plants should provide an adequate supply for summer use and 50 to 75 plants a year's supply.

Culture, Harvest, and Storage

Early, midseason, and late varieties can all be grown successfully up to altitudes of about 6,000 feet in the north-central high Plains and up to altitudes of 7,000 feet in the south-central high Plains. At higher elevations the growing season is too short for late-maturing varieties and midseason or even early-maturing varieties must be grown (table 1).

Cabbage plants should be started indoors about 6 weeks before they are to be set in the garden (p. 15). They are very hardy and for the early crop should be set in the garden as soon as danger of killing frost is past (table 2). Water should be applied to the seedlings as soon as they are set, to prevent serious wilting. Cultivation should be shallow and should be limited to that necessary to control weeds.

Cabbage responds well to irrigation. For maximum yields and quality the plants should be irrigated frequently until the heads are well formed. However, water must be applied with caution

as the heads approach maturity, because a heavy irrigation at this stage may cause them to burst. Cabbage is a dependable crop for dry-land gardens having soils normally well supplied with moisture.

Early cabbage may be harvested as soon as the heads are sufficiently solid for use. Cabbage for storage should be left in the garden until the heads are as solid as they can become without bursting.

Sufficient cabbage for home use can be stored in almost any storage in which temperatures can be kept low and humidity moderate. Temperatures about 33° to 35° F. are best, and the humidity should be high enough to prevent wilting. Cabbage can also be stored in the ground in shallow pits covered with boards and alternate layers of straw and soil. In this type of storage the pit is usually about 2 feet deep and of such width that it can be easily covered with the lumber available. The length is determined by the quantity of cabbage to be stored. The cabbages are placed in the pit either on their sides or head down, and the ends of the pit are left open for ventilation until the weather is sufficiently cold to prevent moisture from collecting.

Varieties

Golden Acre, an early strain of Copenhagen Market, is perhaps the best early variety for this region. It produces solid, nearly round heads averaging 2 to 2½ pounds for early-set plants and 3 to 3½ pounds for late-set ones. It reaches edible maturity 60 to 65 days after the plants are set. Early Jersey Wakefield is another popular early variety. Its heads are compact and conical or bluntly pointed and weigh 1½ to 3 pounds. It is claimed that the leaves of this variety are thinner and sweeter than those of other varieties.

Glory of Enkhuizen and Succession are two midseason varieties well adapted to this region. The first of these produces fairly large, round, solid heads averaging about 5 pounds in weight, which mature about 77 days from the time the plants are set. Succession produces large, thick, flat heads that average about 8 pounds in weight and require about 85 to 90 days to reach maturity. At lower altitudes these are true midseason varieties, but at higher elevations they become in effect late-maturing varieties. The heads keep fairly well in storage. All Seasons, a midseason variety producing large, deep heads averaging about 8 pounds in weight, is perhaps somewhat better for storage than the two varieties just mentioned. Also it is considered more dependable in hot, dry weather. It matures in about 90 days after the plants are set.

Danish Ballhead (Hollander, Ferrys Hollander) and a strain selected from it known as Wisconsin Hollander are perhaps the two best late or storage varieties for this region. They both produce medium-sized, deep, round, very compact heads weighing about 7 to 8 pounds. Wisconsin Hollander, which is yellows-resistant, should be grown where yellows is known to be present. These varieties mature in approximately 100 to 110 days from setting. Premium Late Flat Dutch is a very large, flat-headed variety popular as a late or storage variety up to altitudes of

about 6,000 feet. Typical heads measure 12 to 14 inches in diameter, 7 inches deep, and weigh 12 or more pounds. The variety matures 100 to 110 days from plant setting.

Savoy, or curly-leaf, cabbage can be grown under irrigation in practically all sections of the region. It is not well adapted to dry land. Chieftian Savoy and Cornell Savoy are midseason to late-maturing varieties that can be recommended for certain sections (table 1). Perfection Drumhead Savoy is a late, large-headed type that can be grown at lower altitudes. Savoy-type cabbages are not so sure-heading as the plain-leaved types, but they do well under favorable conditions.

CANTALOUPS (MUSKMELONS)

The low-altitude, high-temperature sections of the region are ideal for the production of cantaloups (muskmelons). Because cantaloups require high temperatures and a rather long growing season, they make their best growth in this region at altitudes of less than 5,500 feet; at higher altitudes only the very earliest maturing varieties should be grown (table 1).

Culture, Harvest, and Storage

Cantaloups are commonly grown from seed sown in the open ground after all danger of frost is over (table 2). Cantaloups can also be started indoors in pots, in berry boxes, or on blocks of sod and later transplanted to the garden after all danger of frost is over. The last method of starting the crop is of value in obtaining early maturity in short-season sections. However, cantaloups do not withstand transplanting well, and special precautions must be taken to avoid injuring the roots when the plants are transplanted. Plant protectors are often used until the cantaloup plants are well established and warm weather is assured.

Cantaloups are fairly drought-resistant and can be grown on dry land except on very dry soils or where high summer temperatures are the rule. For best quality and maximum yields, however, cantaloups are benefited by irrigation in most sections of the region. In the low-altitude, high-temperature sections sufficient water should be supplied to keep the plants growing vigorously at all times. At higher altitudes or in low-temperature sections, sufficient water should be supplied to keep the plants growing vigorously until the fruits start to develop; later, water should be applied more sparingly or maturity will be seriously delayed.

Cantaloups should not be harvested for home use until the fruits are well netted and the stems separate from the fruits easily. They are of highest quality at this stage of maturity. Honeydew melons, casabas, and cantaloups of European or Asiatic origin do not separate from the vines at maturity and so must be pulled or cut from them. Their degree of ripeness is shown by changes in skin color and softness of the fruits at the blossom end.

Mature cantaloup fruits will not keep more than a few days; even in cold storage they quickly lose their flavor. Melons of

the honeydew type can be stored for weeks or even months in cold storage if the fruits are harvested before they become soft.

Varieties

The most important cantaloup varieties for home gardens in this region, together with flesh color and the approximate number of days from field seeding to maturity, are as follows:

Variety:	Color of flesh	Period to maturity (days)
Casaba (Golden Beauty).....	White	114
Emerald Gem.....	Deep rich salmon	84
Extra Early Hackensack.....	Green	81
Extra Early Knight.....	Medium green	83
Extra Early Osage (Millers Cream)	Rich orange salmon	90
Golden Champlain (Lake Champlain)	Salmon orange	82
Hales Best No. 36.....	Deep salmon	84
Honey Dew, Green Fleshed (Antibes)	Light emerald green	113
Honey Rock (Sugar Rock)....	Deep salmon	85
Imperial No. 45.....	Light orange	88
Perfecto	Deep salmon	88
Rocky Ford (Netted Gem)....	Green	90
Tip Top	Bright salmon	91

CARROTS

Carrots are among the most popular crops for the home garden for both summer use and winter storage. Carrots of good quality can be raised in all sections of the region (table 1) and on dry land as well as under irrigation. They are an excellent source of vitamin A, a good source of vitamin B (thiamine) and of vitamin G (riboflavin), and a fair to poor source of vitamin C.

Culture, Harvest, and Storage

Carrots are very hardy and can be sown in the spring as soon as danger of severe freezing is past. A second planting can be made in June to extend the harvest season; but the difficulty of getting a good stand of plants from later seedings, especially at lower altitudes, makes it advisable to plant early, midseason, and late varieties at the same time in the spring. It should be emphasized, however, that carrot seedlings are very weak growing; therefore the seed must not be planted deep. Light types of soil are best suited for carrots, and rocky, clayey soils or those that have been manured recently should be avoided. Carrot seed germinates slowly, and quick-growing weeds often crowd out and seriously injure the young seedlings. This can be avoided by mixing it with a few radish seeds when sowing. The radishes develop quickly, marking the rows and thus making earlier weeding and cultivation possible.

Carrots benefit greatly from irrigation, but the moisture supply should be kept fairly constant because alternate periods of drought and moisture cause the roots to crack. Under dry-land

conditions wider spacing of the plants in the row (table 2) and shallow, frequent cultivation to control weeds are essential for good crops.

Harvesting can begin when the carrot roots are the size of one's little finger. If the largest roots are pulled each time, the smaller ones are given a better chance to develop; thus the early harvests serve as thinnings. Mature roots for storage should be carefully dug, and only perfect ones should be put in storage. Carrots are very subject to soft rots in storage, especially if they have been cut or broken. Carrots are stored by the same method as described for beets.

Varieties

Carrot varieties (fig. 13) recommended for this region are Early Scarlet Horn, Red Core Chantenay, Danvers Half Long, Nantes (Coreless), Morse's Bunching, and Imperator.

Of the varieties listed, Early Scarlet Horn matures about 63 days from seeding and Nantes (Coreless) about 68 days. Thus these two varieties can be grown as early types, but because

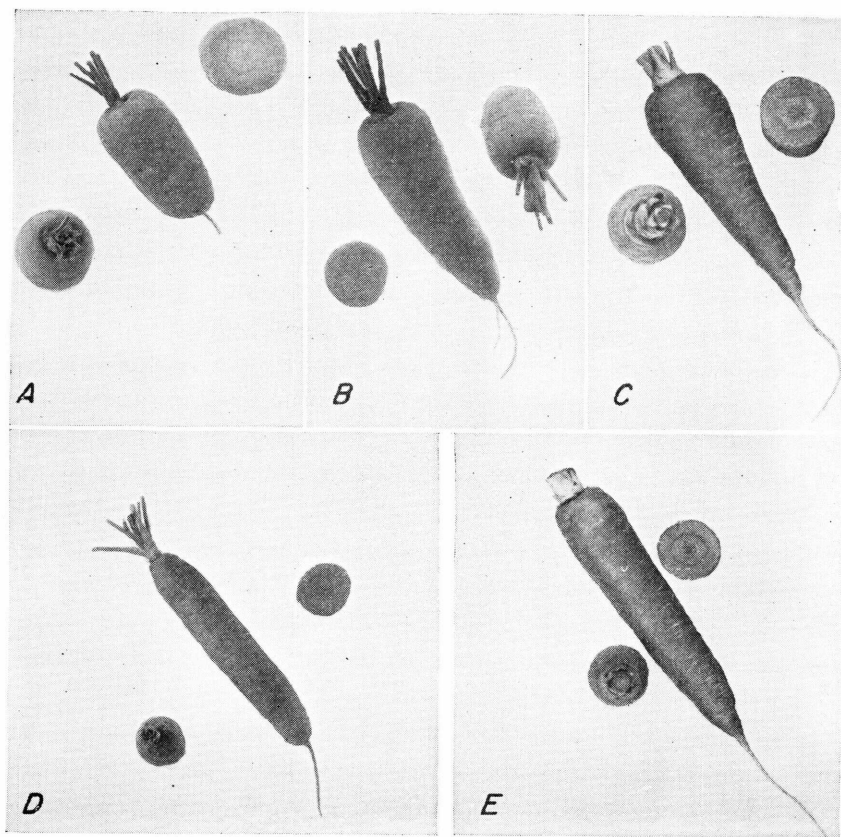


Figure 13.—Roots of five popular varieties of carrot: A, Early Scarlet Horn; B, Red Core Chantenay; C, Danvers Half Long; D, Nantes (Coreless); E, Morse's Bunching.

Nantes retains its excellent table qualities longer than any other variety it may be left in the ground for harvesting as a late or storage variety. Red Core Chantenay matures about 72 days from seeding and is thus an early to midseason variety. Like Nantes, it retains its quality over a long period and is also one of the best storage varieties. Danvers Half Long matures in about 75 days and is best grown as a late or storage variety. Morse's Bunching and Imperator, though they require about 77 days to reach maturity, are better in quality if harvested before they are fully mature. Therefore they can best be grown for use in the late summer and early fall.

CAULIFLOWER

Cauliflower is classified as a cool-season crop; its commercial production is confined chiefly to sections where average temperatures during the growing season are comparatively low. However, it can be grown successfully in home gardens in any part of the region if proper attention is given to time of planting and to selection of varieties (tables 1 and 2). Cauliflower is more difficult to grow than cabbage, but it is well worth the extra effort expended if heads of good quality can be produced.

Culture, Harvest, and Storage

Cauliflower is grown in the same manner as cabbage. Seeding is done indoors or in a plant bed about 6 weeks before the plants are to be set in the garden, as described on page 15. The plants should not be allowed to become stunted during the seedling stage, or they may form heads prematurely and the condition known as buttoning will result. In many parts of the region the growing season is short and cool. Such sections are ideal for the production of cauliflower. In the lower altitude sections, especially on the plains, summer temperatures are generally too high for good cauliflower production. In such sections the plants should be transplanted to the garden late enough for head formation to take place during the cool fall months. Transplanted plants should be watered as soon as they are set in the garden to prevent serious wilting.

Cauliflower is not well adapted for dry-land culture, because it requires liberal applications of water for the development of heads of high quality. Irrigation does not delay maturity of this crop as it does that of such crops as tomatoes, but rather it appears to hasten maturity.

The edible part of the cauliflower plant is the tender white head, or curd, formed by the flower parts. If exposed to the sun, this head becomes brown and loses its high quality. To prevent this, the leaves should be tied over the head with a string when it is 2 to 3 inches in diameter. If tied when too small, the head does not develop properly; it is better to tie the leaves when the head is a little too large rather than when it is too small. As the head is actually composed of the flower parts, it eventually separates and the flowers open. Harvesting should always be done before the head starts to separate or becomes ricey or discolored. The stage for tying, the method of tying, and a mature head ready for table use are shown in figure 14.

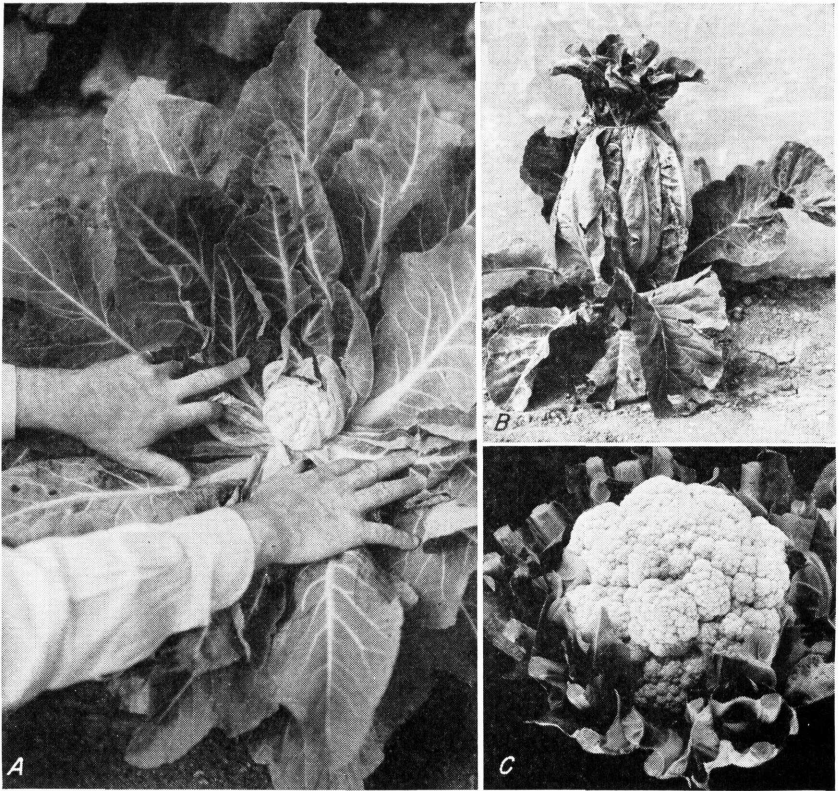


Figure 14.—A, Small cauliflower head at proper stage for tying; B, same plant as in A, after tying; C, trimmed mature head of cauliflower.

Little is known about the storage of cauliflower. Some attempts have been made to store it in pits similar to those used for cabbage, but this method has not proved satisfactory. Probably the most suitable method of storage for short periods is to wrap the heads in paper and store them on shelves in a cellar or cold-storage room. If the temperature of the storage room can be kept between 34° and 38° F. storage for 1 month may be satisfactory. When cauliflower is stored in this manner, the leaves, especially those which surround the head, should not be removed.

Varieties

Early Snowball is the most dependable variety for high-altitude sections or those having a short growing season. It matures 55 to 60 days from the time of setting the plants in the garden, but the heads are somewhat smaller than those of later varieties. Heads of Early Snowball are usually 6½ to 7½ inches in diameter and average 2½ to 3 pounds in weight.

For localities having a longer growing season or for those having a hot, dry growing season the most dependable variety is Danish Giant. The heads are ready for harvesting 65 to 70 days after the plants are set in the garden. Because this variety is said to be somewhat resistant to dry weather, it is sometimes called Dry Weather.

CELERIAC

Celeriac, or turnip-rooted celery, is closely related to celery. It is grown for its thick tuberous base, which is used in flavoring stews and soups, in salads, and as a cooked vegetable. The plants are darker green and less upright than celery plants, and the stalks are usually hollow. After the plants are set (table 2), approximately 120 days is required for them to reach maturity.

The culture of celeriac is the same as that of celery (below) except that celeriac does not require blanching. The tuberous base attains a size of 2 to 3 inches. It is formed just above the ground at the union of the leafstalks with the stem. The whole plant is harvested, and the leaves and roots are removed. Celeriac may be stored like beets, carrots, or other root crops; it will keep throughout the winter under suitable storage conditions. To prepare celeriac for use, the rough outside layers of the tuber are peeled off down to the white, meaty interior.

There are not many varieties of celeriac, and most American seedsmen list only Large Smooth Prague, which has been found to be as satisfactory as any variety for this region (table 1).

CELERY

For the home gardener celery presents a few problems not encountered in the raising of most other garden crops. However, the reward of having this delicious vegetable always available for use from midsummer up to or past the holiday season will amply repay the gardener for the slight extra care involved.

Culture

Celery should be started indoors where suitable growing temperatures can be maintained. The most satisfactory temperature range is 70° to 75° F. The temperature should not fall below 60° for any considerable period; temperatures lower than this may cause the plants to bolt to seed soon after they are set in the garden.

Celery seed should be sown about 10 weeks before the plants are to be set in the garden. Plants can be raised from seed sown in small boxes, which can easily be cared for in the house, or one or two rows may be sown across a hotbed. Because the seeds are small and slow to germinate they should not be covered with more than one-third inch of soil, the surface of which should not be allowed to dry out until after the plants begin to come up. Small pieces of burlap placed over the seed flats help keep the soil moist and the seed from being washed out by watering. These should be removed as soon as the plants emerge, 10 to 20 days after the seed is sown.

When the seedlings are $\frac{1}{2}$ to 1 inch in height or are putting out their first true leaves, they should be transplanted to other containers and spaced about 2 inches apart in each direction. This spacing allows room for the development of good, stocky plants. Plants 4 to 6 inches in height are considered most desirable for setting in the garden (table 2).

Celery is not adapted to dry-land culture unless the soil is exceptionally well supplied with moisture. As so much depends

on the nature of the soil, no hard and fast rules can be laid down for irrigation. However, sufficient water should be applied to keep the plants growing steadily; any check in growth may result in a poorly flavored product.

Blanching

Celery that is to be used in the late-summer and fall months may be blanched for 10 days to 2 weeks before harvest. The blanching process causes the tender inner stalks to elongate rapidly, thus adding much to the quality of the crop. At the time they are ready for blanching, the plants will range from 10 to 15 inches in height.

There are several methods of blanching. Some gardeners prefer to set boards along each side of the row. Such boards should be of sufficient width to protect all but the very top leaves from the sun. The bottom edges of the boards are spaced 9 inches to 1 foot apart, and the top edges are drawn together until they fit rather tightly against the tops of the plants or so that they exclude as much of the sunlight as possible from the stalks.

Blanching may also be accomplished by folding newspapers to the proper width and tying them around the individual plants. Whatever method is used, however, no more plants should be blanched at one time than can be used in a relatively short period after the process is completed, because there is some danger that diseases may attack the blanched plants and they may become pithy if confined too long.

Celery intended for storage may be partially blanched by the methods described for the early crop, or it may be blanched by banking the plants nearly to the tops with soil. However, most gardeners do not blanch celery intended for storage. Care should be taken that the soil does not get into the center of the plants and that the leafstalks are not injured. To avoid this difficulty, it is often necessary to pack a small quantity of soil around the bases of the plants to hold the stalks together; then the bulk of the soil is drawn into position. Banking should not be practiced where the soil is of a heavy clayey nature.

Occasionally gardeners blanch celery by gradually banking the soil up around the plants as they grow, thus keeping the stalks blanched at all times. Although this method is often successful, it is not recommended as a general practice because of its stunting effect on the plants and the excellent conditions it creates for the development of diseases.

Many people consider unblanched celery equal in flavor and tenderness to the blanched product, and it is now known that blanching does destroy some of the vitamin A content. In recent years more and more unblanched celery has been appearing on the market, and it seems likely that in a few years blanching may be discontinued as a commercial practice. It is suggested that home gardeners experiment to determine which type they prefer.

Harvest and Storage

Celery is harvested by lifting the entire plants. If it is to be stored, most or all of the roots are left on the plants, but the worthless outside leaves may be removed.

There are several methods of storing celery. Some gardeners keep it where it is grown by banking it with soil until the tops are nearly covered. Cornstalks, waste hay, or similar materials are then placed over the rows and held in place with boards or soil. Additional covering may be added as the weather becomes colder. This is one of the best methods of storage to keep celery crisp and tender, but it is somewhat inconvenient to take the celery out later. Celery may also be stored in cellars that are kept cool and moist so that the celery does not wilt. The plants are set close together on the ground with their roots intact, and a little moist earth is drawn around the roots. Additional water is given if the plants show signs of wilting.

Probably the most popular method of storing celery is by the use of trenches. A trench 10 to 12 inches deep is dug in some convenient location where surface water will not bother. The trench may be of any width desired, but it is usually 18 to 20 inches wide. The celery plants are set close together in the trench with their roots intact. To prevent wilting, the soil in the bottom of the trench should be lightly watered. Boards or other suitable materials are then placed over the trench and covered with hay or straw. Until the weather is cool enough to keep the celery from heating in the trench, some ventilation should be given, either by constructing the ends of the trench so that they can be easily opened or by propping up the boards along the sides of the trench with blocks or stones. As the weather becomes colder, the covering over the trench can be thickened by adding alternate layers of straw and soil.

If proper care is exercised in storing celery it should keep in fairly good condition until after the winter holiday season.

Varieties

Either the dwarf or the newer tall strain of Golden Self Blanching is the most popular variety for home culture. It is one of the earliest as well as one of the best flavored varieties (table 1). The plants are medium in height, stocky, and compact. The foliage is light yellowish green, and the stalks are solid and develop a delicate nutty flavor and a golden-yellow color in blanching. The tall strain has somewhat longer leaf-stalks than the older, dwarf strain, but its stalks are smaller in diameter and it is slightly earlier in maturing.

Golden Plume (Wonderful) is another excellent early variety closely resembling Golden Self Blanching in appearance and general qualities, but it is 5 to 7 days earlier in maturing. Easy Blanching (Sanford Superb) is a fine, second-early variety. It is slightly taller than Golden Self Blanching, matures about 2 weeks later, blanches to an almost pure white, and keeps better in storage. Emperor (Fordhook) and Giant Pascal, two of the best varieties, are not well adapted to altitudes above 6,000 feet, because they are relatively slow growing and late maturing. The quality of these varieties is usually conceded to be superior to that of the other varieties mentioned; for this reason they are worthy of trial in sections having a comparatively long growing season. Utah (also known as Salt Lake and Golden Crisp) is a relatively new, green-colored variety that

matures about a week earlier than Giant Pascal. The plants are stocky and compact and have a very full heart. They blanch readily and are excellent for storage.

CHARD (SWISS CHARD)

Chard (Swiss chard) is actually a type of beet which has been developed to produce a large quantity of foliage. It deserves a place in every home garden and is especially valuable for the low-altitude sections because it grows well in hot weather (table 1). Chard is superior to most other greens in that it is early maturing and provides a continuous supply of greens throughout the season. Chard is also fairly hardy and will produce well into the fall, especially if protected so it is not subjected to hard freezes. The leaves are usually prepared for the table in the same manner as spinach, and the leafstalks, or petioles, may be cut into small pieces and cooked like asparagus.

Culture and Harvest

The culture of chard is similar to that of beets. It is usually sown directly in the garden 7 to 10 days before the average date of the last killing frost. When the plants are about 2 inches in height, they can be thinned to the desired stand. Some gardeners, however, prefer to thin them to about 3 inches at this stage and when the remaining plants are 6 to 8 inches in height to thin them again to the desired distance, the thinnings being used as greens (table 2).

Chard will grow well on dry land, but applications of water two or three times during the season result in a product of better quality.

Chard is harvested by cutting the leaves off near the soil surface, but not so close to the crown that the bud, or growing point, is injured. New leaves take the place of those harvested and furnish a continuous supply. The larger leaves may be harvested each time or all leaves may be cut at once, but for the home gardener the former method is more desirable.

Varieties

The most commonly grown varieties of chard are Lucullus and Fordhook Giant. The leaves of Lucullus, which are lighter green than those of Fordhook Giant, are consequently not so attractive. There is little difference between them in quality or in yields.

CHINESE CABBAGE

Chinese cabbage, which is rarely grown by home gardeners in this region, is worth a place in every home garden. It has a distinctive and agreeable flavor either raw or cooked; the fact that it is found on many vegetable markets throughout the year indicates that there is a rather widespread demand for it. Perhaps the most important reason it is not grown more in this region is that the plants often produce seedstalks prematurely or before an edible head is formed. This difficulty can be largely

overcome by proper cultural methods and care in the selection of varieties (table 1).

Culture, Harvest, and Storage

Chinese cabbage is usually seeded in the garden; although this is considered the better method, it may be seeded in a greenhouse or hotbed and transplanted to the garden. If it is to be grown as a spring crop, it should be seeded in the garden as early as possible after danger of killing frost is over. Seedlings for fall crops should be made approximately 75 days before the first killing frost in the fall. In locations with climatic conditions similar to those of Cheyenne, Wyo., the fall crop should be planted about July 1; however, the date will vary considerably with the season and the variety used. When the plants have reached a height of 2 or 3 inches they should be thinned (table 2).

Chinese cabbage is not adapted to dry-land culture. To insure good head formation, an adequate supply of water is necessary throughout the growing season. Lack of water, especially if the air temperature is high, tends to promote seedstalk formation before an edible head is formed.

Harvesting is accomplished in the same manner as with true cabbage. Solidity of head is used as a basis for judging maturity, the best heads being very firm and solid. Chinese cabbage heads ready for use are shown in figure 15, *C* and *D*.

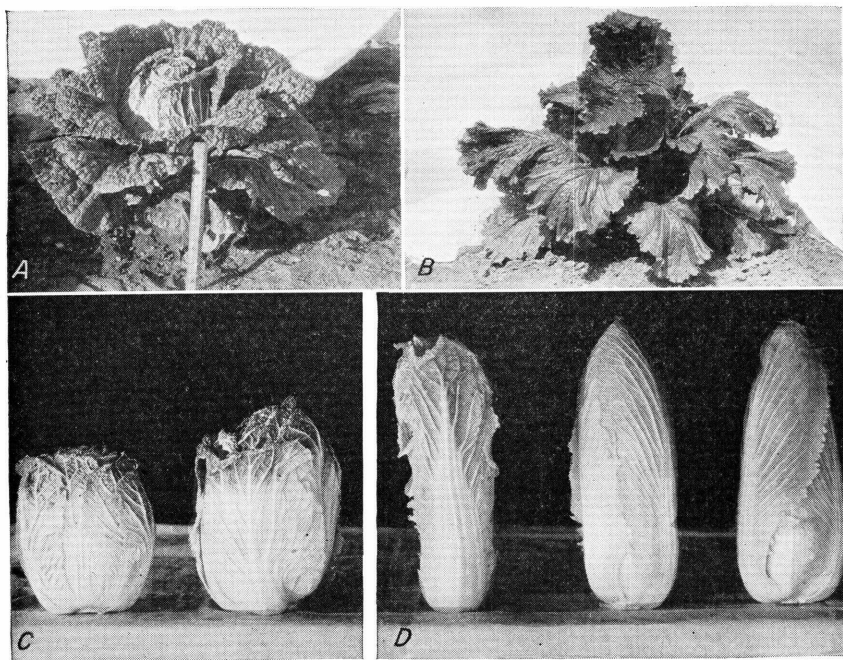


Figure 15.—*A* and *B*, Chinese cabbage plants: *A*, Cheefoo; *B*, Chihli. *C* and *D*, Typical trimmed heads of Chinese cabbage: *C*, Cheefoo; *D*, Chihli.

Chinese cabbage can be successfully stored for considerable periods. When grown as a spring crop, it cannot be stored unless cold-storage facilities are available and the temperature can be maintained at 34° to 40° F. When it is grown as a fall crop, the heads may be put in cold storage or stored in pits or other structures as described for cabbage. In China the plants are pulled and dried for a day or two in the field, and then the heads are piled up and covered with layers of straw and soil. They are reported to keep well into the winter when stored in this manner.

Varieties

Careful selection of varieties is necessary if the home gardener expects to produce satisfactory heads of Chinese cabbage. One of the most dependable varieties for general culture in this region is Chihli (fig. 15, *B* and *D*). If it is planted so that heads form during the early-summer or fall months, a large percentage of the plants will produce excellent heads. Typical heads are 18 to 20 inches in length and 4 to 6 inches in diameter. Two varieties, of which seed was obtained in Japan—Cheefoo (fig. 15, *A* and *C*) and Hakusai No. 2—have shown considerable promise in the variety trials at the Cheyenne Horticultural Field Station. Seed of Cheefoo can be obtained in this country. Both of these varieties have consistently formed good heads even under relatively poor growing conditions. The heads of Hakusai No. 2 and Cheefoo are characteristically round to oval, usually ranging from 8 to 10 inches in diameter. These varieties are especially recommended for sections where high temperatures prevail during most of the growing season.

CHIVES

Chives, doubly useful members of the onion family, can be grown in all sections. As a crop in the perennial garden they are a source of flavoring material almost from the time the frost leaves the ground in the spring until the killing fall frosts. They are also an attractive ornamental frequently used around flower beds, along walks, or in similar locations.

The plants grow to a height of 6 to 8 inches and form tufts of slender hollow leaves. The flowers, which are light purple, occur in a small, globular head, or cluster. The leaves may be cut freely, as they are quickly replaced; and many gardeners make a practice of cutting the plants back once or twice during the growing season to insure a supply of tender young leaves for flavoring or for salads.

Chives are usually propagated by dividing the plant clusters, but seed can be readily obtained from seed houses. The seed should be sown in shallow furrows and covered with a very thin layer of soil. After the plants have emerged they should be thinned to stand 6 to 12 inches apart in the row (table 2). These single plants multiply quickly and form clusters or stools. These clusters should be lifted every 2 or 3 years to maintain vigorous growth. Potted plants can be grown in the house over winter to provide a continuous supply of leaves.

There are no named varieties. Simply chives is listed in most seed catalogs.

COLLARDS

Collards are not commonly grown in this region (table 1), but their culture is relatively simple and they make a desirable substitute for cabbage. Collards may be described as a nonheading cabbage of which the edible portion is the rosette of leaves borne at the top of the plants.

Like cabbage, collards are most frequently grown from seedlings started indoors and transplanted to the garden when they are about 6 inches high (table 2). Seed may also be sown where the crop is to grow, and the plants are thinned to the desired distance in the rows. Collards succeed fairly well under dry-land culture if the ground is well supplied with moisture. A better product is produced under irrigation, however, and, when so grown, collards are given the same culture as cabbage. The plants grow slowly during the hot summer months, but they make rapid growth in the fall. The flavor of the leaves is somewhat improved by a slight frost.



Figure 16.—Plant of Georgia collard about three-fourths-grown.

Harvesting may be accomplished either by cutting the whole young plants when they are about one-fourth-grown or by cutting off the rosette of top leaves when the plants are nearly mature.

The variety most commonly listed by seedsmen is Georgia (fig. 16). However, an improved strain known as Louisiana Sweet can be obtained from some seed houses.

CORN (SWEET)

By proper selection of varieties it is possible to grow sweet corn in practically all parts of the region except where low average temperatures prevent the normal development of the plants or killing summer frosts are frequent (table 1). In the

more northerly sections the critical altitude ranges from 6,500 to 6,800 feet, but it may be slightly higher in the more southerly sections. Corn earworm and smut are the most serious obstacles to the culture of sweet corn at the lower altitudes or in the true-plains sections, but they are of less importance as the altitude increases. Thus, the most favorable conditions for the culture of the crop are to be found in sections having altitudes of 4,500 to 6,000 feet.

Culture

Sweet corn should be planted in the spring at about the time of the average date for the last killing frost. It can be sown in rows or planted in hills of three to four plants each (table 2). To obtain well-filled ears several rows of corn should be planted together. If only a small planting is desired, four or five short rows are, therefore, better than one or two longer ones. The remainder of the corn rows can be planted to later lots of corn or to some other crop; such planting prevents waste of garden space. Sweet corn should not be cultivated deeply, because most of the roots are located in the top 4 to 6 inches of soil and serious injury will result if they are destroyed. If it is not necessary to control weeds, there is little or no need for cultivation.

The irrigation requirements of corn depend on several factors, the most important of which are the soil type and the climatic conditions. Corn responds well to relatively large quantities of water, and its condition must be carefully watched if it is grown on sandy or leachy soils; otherwise it may be seriously injured through lack of moisture. Likewise, if it is grown where high mean summer temperatures are the rule, it should receive relatively heavy and frequent irrigations for best results. Unlike such crops as melons and tomatoes, corn is benefited by irrigation when the crop is maturing, as water applied at this time adds to the size and succulence of the ears. As with most crops, irrigation during the latter part of the season will somewhat delay maturity, but this difficulty can be overcome by selecting varieties that mature sufficiently early despite the retarding influence of late irrigations. At higher elevations, especially as the upper range of the adaptation of sweet corn is approached, greater care is required in applying water, because too frequent or too heavy applications will induce vigorous plant growth and make even the very earliest varieties too late in maturing.

Varieties

A sharp distinction should be made between the common, or open-pollinated, and the newer hybrid varieties of sweet corn. If an open-pollinated variety is grown, seed may be saved and will come true to type in subsequent years, provided, of course, that no other varieties of sweet or field corn are planted near enough to cross with it. In the case of the hybrids, however, seed should not be saved, because in the following year the crop will not be like the variety originally planted. Although this makes it necessary to buy new seed each year, the hybrid varieties are superior in some respects to the open-pollinated varieties and are worth the slight extra cost.

Because the harvest period for any single variety of sweet corn lasts only a few days, many gardeners make succession plantings at about 10-day intervals from the first planting up to about the last week in June. An even better way to prolong the harvest period is to plant early, midseason, and late-maturing varieties at the same time. However, if two or more varieties are planted near each other they will cross; therefore seed should not be saved from such mixed plantings. Pickaninny and Golden Gem are extra-early, open-pollinated varieties adapted to short-season sections. The former is a dwarf type producing very short, small ears. At the edible stage the kernels are white, but they turn purple as they mature. Golden Gem is also a dwarf variety, which produces short, small, yellow ears. Pickaninny is of very good quality and Golden Gem is fair to good. Because of the short and frequently poorly filled ears these varieties are not recommended except for the high-altitude sections.

Golden Early Market, a Golden Bantam type, is an open-pollinated, early variety of high quality which can be recommended for places having altitudes between 4,500 and 6,000 feet. A selection of this variety known as Early Golden Sweet is preferred by many to the parent variety. Sunshine is an open-pollinated, early variety popular in the north-central Plains. It is fair to good in quality. Golden Bantam, an open-pollinated variety, is still a prime favorite with many home gardeners as a midseason variety of high quality. Golden Cross Bantam is a midseason to late hybrid considered by many as having the highest quality of any of the Golden Bantam types. Both it and Golden Bantam should be planted only as late varieties at altitudes of about 6,000 feet.

Stowells Evergreen and Country Gentleman (Shoepeg) are white, open-pollinated varieties of high quality. They are late maturing and should not be planted where the growing season is less than 120 days.

CUCUMBERS AND GHERKINS

There are few crops more desirable for the home garden than cucumbers. Nearly everyone values them highly for use during the summer because few vegetables are more delicious than fresh sliced cucumbers. Also they are used in salads and sandwiches, and many people enjoy them fried. Their importance as pickles or in relishes of various sorts is often underestimated, however; if they were grown for no other purpose than for winter use the time and space devoted to their culture in medium to large gardens would be amply justified.

Culture and Harvest

Cucumbers can be grown successfully in home gardens in all sections of the region up to altitudes where low average temperatures or summer frosts interfere with the development of the vines (table 1). The successful culture of cucumbers in many places depends more on good vine growth than on the selection of varieties.

In sections having a short growing season or when an extra-early crop is desired, cucumbers can be grown from plants started indoors. As they do not withstand transplanting well, the seed is planted in such containers as old berry boxes and pasteboard boxes or sometimes on inverted pieces of sod, which can be set in furrows in the garden without disturbing the young plants. The containers should have holes in their sides or bottoms through which the roots can grow after the plants are set in the garden, or the plants should be removed from them. Five or six seeds are planted in each container, and about a month is allowed for growing the seedlings. They should be set in furrows deep enough so that the ball of soil around the roots will be covered when the ground is leveled. Two or three plants are allowed to grow in each hill.

In sections having longer growing seasons or altitudes up to about 6,000 feet seed is normally sown in the garden after all danger of frost is past (table 2).

Clean, shallow cultivation should be given to control weeds. The crop is adapted to dry-land conditions if the soil is normally well supplied with moisture, but severe drought is one of the main causes of bitterness in the fruits. Greater growth and larger yields are obtained when the cucumbers are grown under irrigation. If ripe fruits are desired, the supply of water should be greatly diminished after the plants begin to set fruit freely.

Varieties

Among the slicing types of cucumbers, Arlington White Spine is a good early to midseason variety; Colorado, Straight-8, and Longfellow are among the best of the midseason to late varieties.

Although any of the slicing varieties can be used for pickling if picked when small, many people prefer to grow regular pickling types because of the somewhat better shape of the small fruits. Chicago Pickling (Westerfield), National Pickling, Snows Pickling, and Mincu are recommended varieties of the pickling type. Early Cluster is used considerably both as a slicing and as a pickling variety. Fruits for pickles should be picked frequently to keep the vines bearing. The mature fruits of the pickling type of cucumber are of very poor quality, and allowing fruits to mature on the vines will seriously lessen yields.

Fruits of the West India gherkin are highly prized by many people for pickling. The plant somewhat resembles that of the cucumber, but the fruits are small, oval, light green, and thickly covered with spines. The fruits are made into sweet pickles when still immature or before the spines toughen. Cultural methods used for cucumbers are satisfactory for this crop.

EGGPLANT

Tests throughout the region showed that the eggplant can be grown successfully in practically all sections up to altitudes of at least 6,000 feet (table 1). In favorable years and in more than 50 percent of the trials some varieties produced fairly satisfactory yields at altitudes of 6,800 feet, but above 6,000 feet many failures may be expected.

Culture and Harvest

Eggplant requires the same culture as tomatoes except that the plants may be set closer in the garden. The young plants are somewhat slower growing than tomatoes and should receive the best of care during the seedling stage; also they are somewhat tender and should not be set in the garden until all danger of frost is past (table 2).

Eggplant does not withstand drought conditions so well as peppers or tomatoes and so is not so well adapted to dry-land culture. When it is grown under irrigation, however, water

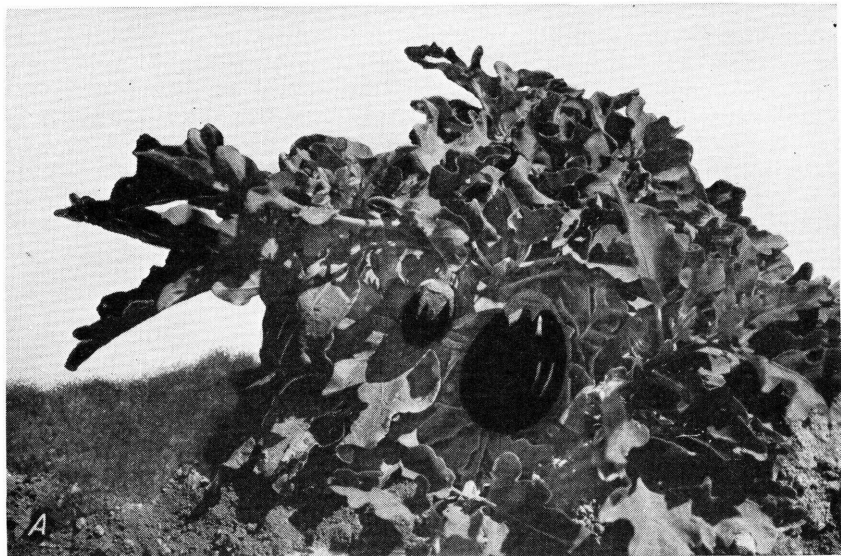


Figure 17.—Plants and fruits of two varieties of eggplant: A, New Hampshire Hybrid; B, Black King.

should be applied with great care after the plants have set fruit; subsequent heavy applications will delay maturity.

The fruits are edible from the time they begin to enlarge until they become soft or withered from overmaturity. The fruits should be harvested when they are a third- to half-grown to prolong the harvest period. This is important with a crop that does not keep well in storage. The stems of the fruits, which are rather woody, should be cut with a knife or clippers to avoid injury to the plants during harvest.

Varieties

The following varieties of eggplant were found satisfactory for home gardens in this region up to altitudes of about 6,000 feet: New Hampshire Hybrid (fig. 17, A), Black Beauty, and New York Improved Spineless. These also produced satisfactory yields in favorable years at altitudes of 6,300 feet, but they are larger fruited, later sorts and are better adapted to lower elevations. For altitudes of about 6,000 feet or above Extra Early Dwarf Purple and Long Purple are recommended. Blackie and Black King (fig. 17, B), which are offered for sale by certain Canadian seed houses, also are recommended as extra-early varieties.

ENDIVE

Endive is considered one of the choicest salad crops by those best acquainted with it. It is exceptionally high in vitamin A. Its finely curled leaves make an unusually attractive salad, and its pleasant, slightly bitter taste contrasts well with the bland flavor of the more common salad plants.

Many people prefer endive, especially the Batavian, or escarole type, cooked as greens, or potherbs. Prepared in this manner, it is very similar in texture and flavor to dandelion greens.

Culture, Blanching, Harvest, and Storage

The culture of endive is similar to that of lettuce. The seed may be sown in the spring as early as the ground can be prepared. As soon as the plants are about 2 inches high, they should be thinned to the desired stand (table 2).

Endive cannot be recommended as a dry-land crop except on soils well supplied with moisture. When grown under irrigation, it should be watered frequently to produce the greatest possible growth and succulence.

If endive is to be used for salads, blanching greatly improves the texture and flavor of the leaves. Any method that excludes sunlight from the center of the plants may be used. Some gardeners prefer to cover the plants with hay, straw, or similar materials; others prefer to use boards nailed together to form an A-shaped cover. The usual practice, however, is to gather the outer leaves together and tie them near the top to protect the center of the plant from sunlight. Regardless of the method used, growers should examine the plants frequently to be sure that water does not collect in the centers, for collected water will cause them to rot. Blanching requires 10 to 20 days, depending on the temperature. Cool weather delays the process. The plants

should not be blanched much faster than they are used, or they may decay. In late fall they can be protected from freezing by covering them with hay or straw or by lifting them with roots intact and resetting them close together in some sheltered location as described for cellar storage of celery.

Varieties

The few varieties of endive on the market thrive about equally well in this region. In the low-plains sections or wherever summer temperatures are high any variety may bolt to seed. On the other hand, the plants are hardy and make excellent growth at altitudes from 4,500 feet up to those where killing frosts may be expected throughout the summer (table 1).

White Curled (fig. 18, A) is a small variety averaging about 12 inches in diameter. Its finely divided or curled leaves are light yellowish green, blanching to a creamy white. Green Curled Red Ribbed (Pancalier) is a more vigorous and somewhat hardier sort than White Curled. Its leaves are divided much like those of White Curled, but they are bright deep green with a trace of red along the midribs. They blanch to a creamy white.

Broad Leaved Batavian (escarole) (fig. 18, B) has broader leaves than the varieties just described; the leaves are toothed or notched and twisted instead of being finely divided or curled. It is frequently used without blanching in soups and stews or as a potherb; but when well blanched, it is also eaten as a salad and is not inferior to the curled types. Full Heart Batavian (Full Heart)

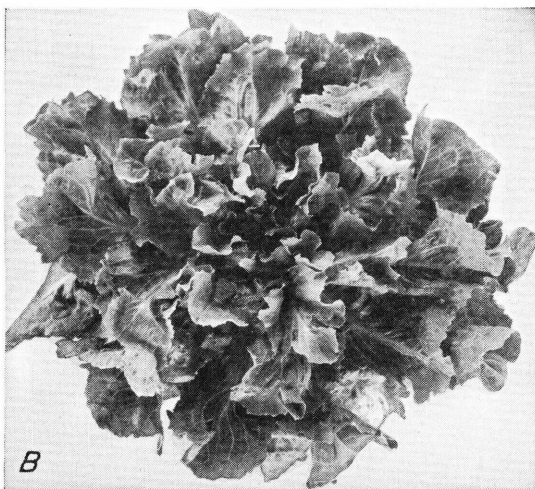
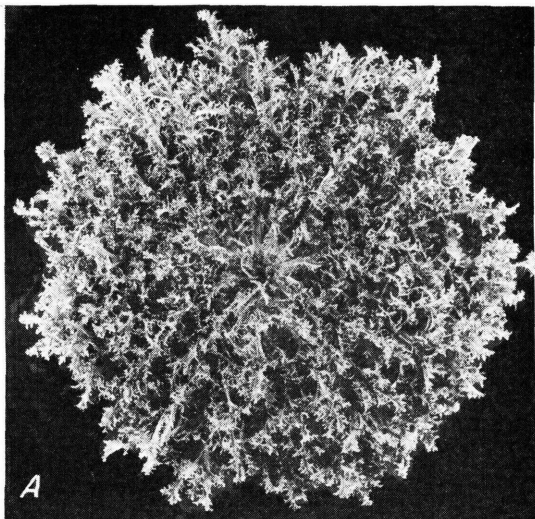


Figure 18.—Plants of two types of endive: A, Curled-leaved type (White Curled variety); B, plain-leaved type, or escarole (Broad Leaved Batavian variety).

is an improved variety with larger leaves and broader, thicker heads which matures earlier than Broad Leaved Batavian.

HORSERADISH

Horseradish well deserves a place in every home garden. A small bed of 15 to 20 plants will furnish an average family with an ample supply for making horseradish relish, a highly prized condiment for meat dishes. In the home garden it is cultivated as a perennial; therefore, it should be placed to one side where it will not interfere with the annual ground-fitting operations.

Culture, Harvest, and Use

New plantings of horseradish usually are started from root cuttings, or sets, made from the lateral roots of mature plants (table 2). They may be obtained from most seed houses or from growers who have taken up an old bed. They vary in diameter from one-fourth to one-half inch and should be 4 to 8 inches long. As purchased from commercial seed houses, these sets are cut off square at the top end and slanting at the lower to denote which way they are to be set. Sometimes home gardeners plant small whole roots, but these produce rough, many-branched roots that are unsatisfactory for grating or grinding.

The horseradish crop requires little irrigation, especially if the garden is so located that moisture from drifting snow is saved. However, sufficient water should be provided for normal growth if the plants are to produce large smooth roots.

The roots may be harvested in the fall and stored until required for use. Most home gardeners, however, prefer to leave the roots in the ground over winter and to harvest them in the spring. If harvested in the spring as soon as the ground has thawed, they furnish one of the first products from the garden. After the roots have been dug, the side roots should be trimmed off and reset, thus assuring a continuous supply of plants.

The main roots are prepared for table use by peeling or scraping away the outer layers and grating the fleshy inner part into vinegar. The most satisfactory vinegar to use is the white-wine, or distilled, type, which may be purchased at almost all grocery stores. Cider vinegar is unsatisfactory because it causes the grated product to lose strength and turn dark in a short time. The finished product should be bottled or placed in airtight containers as soon as it is prepared, because it quickly loses strength if exposed to the air. Keeping it in a refrigerator or other cool place also will conserve its strength.

Varieties

Little work has been done on the improvement of horseradish; therefore there are relatively slight differences among varieties. Seedsmen do not generally list their varieties by name, but those who do so most frequently list Maliner Kren (Bohemian) (table 1).

JERUSALEM-ARTICHOKE

There are at least two excellent reasons for including the Jerusalem-artichoke among the vegetables for the home garden. In the first place, its tubers, although they are much smaller and rougher than those of the potato, have a pleasing nutlike flavor, quite unlike that of the potato. Although they are commonly cooked and served like potatoes, they can be used in several other ways. Diced or sliced thin and used raw in salads, they have a crisp texture and a flavor not unlike that of Chinese waterchestnut. Also they can be cut into long, thin strips like "shoestring" potatoes and served raw as a relish. Secondly, they make an almost ideal perennial vegetable because they are perfectly hardy; the tubers can be left in the ground over winter and dug in the spring to add to the supply of early-spring vegetables. Their most serious defect is that they are naturally rather weedy and for this reason should be planted at one side of the perennial garden, where volunteer plants can be most easily controlled.

Culture, Harvest, and Storage

The Jerusalem-artichoke is propagated by tubers, which should be planted in the spring as early as the ground can be worked. Whole tubers or portions of them weighing 1 to 2 ounces give the best results (table 2). Shallow cultivation should be given to control weeds until the plants are well established; then they will usually shade out the weeds. Although the plants are very drought-tolerant, they require the same irrigation as sweet corn to produce satisfactory crops of smooth tubers.

Jerusalem-artichokes are harvested by cutting off the tops of the plants and digging the tubers at any time after the plants bloom in the fall; because freezing does not injure the tubers, those not required for fall use can be left in the ground over winter.

No entirely satisfactory method of common storage has yet been developed for Jerusalem-artichoke tubers. They lose moisture and shrivel rapidly upon exposure to air and cannot be kept more than a few weeks without heavy losses from shrinkage and sometimes from decay. For this reason it is usually best to harvest only small quantities at a time and leave the unused portion of the crop in the ground. If cold storage is available, sound, disease-free tubers can be stored for several months if the humidity is kept sufficiently high to prevent shrinkage and the temperature is maintained at about 32° F.

Varieties

There are not many recognized or standard varieties of Jerusalem-artichokes. Most seedsmen do not list their stock under varietal names; however, a white-tubered strain, sometimes listed as Mammoth French White (French White Improved), has been found more satisfactory than common stocks often offered for seed (table 1).

KALE

Kale is grown extensively in some parts of the country, but not commonly in this region. It is however, well adapted here,

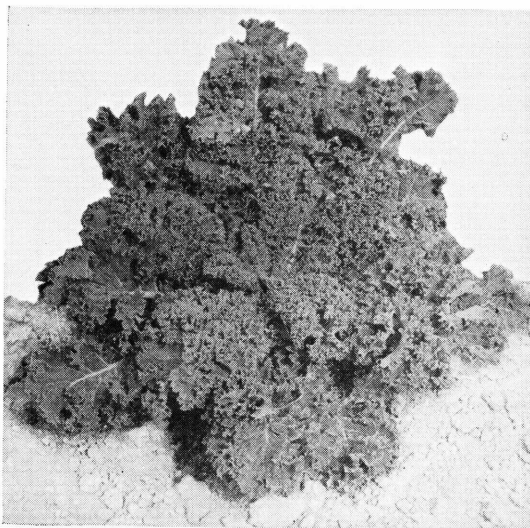


Figure 19.—Dwarf Green Curled Scotch kale plant.

and as its culture is simple it should be added to the list of available potherbs, or greens (tables 1 and 2).

Kale seed is normally sown in the open ground as early in the spring as the ground can be prepared. Plants may also be started like cabbage in hotbeds or coldframes and later transplanted to the garden; this method of starting the crop makes its culture possible even at altitudes where the growing season is very short.

Cultivation should be shallow and only for the purpose of controlling weeds. The crop is benefited by irrigation to keep the plants growing thriftily at all times. It is fairly tolerant to drought, however, and will do well under dry-land conditions on soils normally well supplied with moisture. It succeeds best during cool weather; hence it makes its most rapid growth during the fall or at medium to high altitudes.

Harvesting may be accomplished by stripping the tender leaves from the plants or by cutting the entire plant. Quality is improved by light frosts; as the crop is hardy, it remains in an edible condition until killed by hard freezing.

There are many types of kale, some of which are grown as ornamentals for their beautiful colors and curled leaves. The edible kinds, however, may be classified under two types, the Scotch and the Siberian. The leaves of the Scotch kales are very heavily curled, whereas those of the Siberian varieties are less curled or crumpled. Varieties most commonly listed are Dwarf Blue Curled Scotch, Dwarf Green Curled Scotch (fig. 19), Tall Green Curled Scotch, and Dwarf Siberian. There is little need for selection among the Scotch kales, though the Dwarf Blue Curled Scotch is somewhat better adapted to the higher altitudes because its leaves retain their color better after frost than those of the green-leaved types. Dwarf Siberian, which is somewhat more tolerant to heat than the Scotch varieties, is preferred for the low-altitude sections. Both it and Tall Green Curled Scotch are somewhat later maturing than the first two varieties listed.

KOHLRABI

Kohlrabi is not so commonly grown in home gardens as it would be if more people could be induced to give it a trial. It is

a member of the cabbage family, but the edible part of the plant is the swollen, fleshy stem which forms a turniplike growth just above the surface of the ground (fig. 20). This is cooked and used like turnips and by many is considered superior to them in flavor and quality.

The cultural requirements of kohlrabi are practically the same as those of turnips. Although plants can be raised in the house or in hotbeds and transplanted to the garden, the usual practice is to sow the seed where the crop is to mature. Seed can be sown 5 to 7 days before the last killing frost is expected (table 2).

Clean, shallow cultivation should be practiced to control weeds, and the quality of the crop will be greatly improved by frequent irrigations. As a check in growth causes the edible portions of the stem to become tough or woody, kohlrabi is not adapted to dry-land culture.

The crop is harvested when the swollen stems are about 2 inches in diameter. If the plants are allowed to grow larger, the edible parts quickly become woody and lose much of their flavor. Failure to harvest the crop at the proper stage of maturity is the most common cause of disappointment to those who have grown kohlrabi. For this reason many gardeners make small plantings at about 2-week intervals to insure a constant supply throughout the growing season and for storage. Only young, tender plants should be stored; these should be handled in the same manner as root crops.

Most seed companies list only two varieties of kohlrabi, White Vienna and Purple Vienna. White Vienna is early maturing and the most popular. Both varieties are well adapted for culture in this region and may be expected to make their best growth at altitudes of 4,000 to 6,000 feet, although they can be raised in the low-plains sections if well irrigated and up to altitudes where killing summer frosts may occur (table 1).



Figure 20.—A, Plant of White Vienna kohlrabi suitable for harvesting; B, kohlrabi trimmed for use.

LEEKs

Leeks thrive in practically all parts of this region up to altitudes of about 7,000 feet or where the season is too short for

the plants to complete their growth (table 1). Although leeks are biennials, they are grown as annuals. Practically the same cultural methods are used as in growing onions; the plants, however, are blanched before they are used. True bulbs are not formed; but the bases of the plants are slightly swollen, giving them much the same appearance as green, or bunch, onions.

The seed may be sown in window boxes or hotbeds and transplanted to the garden, or it may be sown directly in the garden. The length of the growing season will determine which is the better method (table 2).

In late summer or early fall the lower parts of the plants are blanched by banking them with soil to a height of about 6 inches. They should not be banked when too young as banking may cause decay. When the banked portions of the plants are well blanched, they are ready for use. At harvest the entire plant is pulled, the roots and unblanched tops are cut off, and the blanched portions are eaten as green onions or are used in cookery.

Plants lifted with most of their roots intact may be stored in cool cellars or trenches as described for celery. If the temperature is kept just above freezing and water is supplied to keep them from wilting, they should remain in an edible condition for 2 or 3 months.

The varieties most commonly listed by American seedsmen are American Flag (London Flag), Giant Musselburg, and Monstrous Carentan. They are listed here in the order of their earliness.

LETTUCE

Lettuce can be grown in practically all sections of the region (table 1). In general it makes its best growth in sections with relatively cool summers and altitudes greater than 5,500 feet. Leaf lettuce can be grown easily at lower elevations, but special attention to varieties and cultural methods is necessary if heading types are to be grown.

Culture and Harvest

Lettuce plants may be started indoors or in coldframes and transplanted to the garden, or seed may be sown directly in the garden (table 2). The transplanting method is of particular importance in the low-altitude sections, because it often makes it possible for head lettuce to mature before the hot weather of midsummer. It may also be used in other sections to obtain an earlier crop than can be obtained by direct seeding in the garden. From 6 to 8 weeks should be allowed for growing the seedlings (p. 15). Light frosts do not harm lettuce, but the seedlings should not be transplanted to the garden until after the average date of the last killing frost.

When lettuce is seeded directly in the garden, it should be planted as early as possible and yet escape killing frosts. The seed should be planted about one-half inch deep in shallow furrows. When the young plants start to develop their fourth leaves, head lettuce should be thinned to single-plant stands,

for if two or more plants are left together they will not form normal heads. Leaf lettuce is often seeded thin so that thinning is not necessary until the plants reach edible size. Thinning is then done by harvesting the larger plants for the table and leaving the smaller ones to continue growth.

Lettuce is not well adapted to dry-land culture, although leaf lettuce will do fairly well on most soils. Head lettuce requires irrigation for best development, especially at lower altitudes, and it should be given sufficient water to keep it growing normally at all times. Cultivation should be shallow and only to control weeds.

Head lettuce is harvested when the heads are as firm and solid as they can be without bursting. The whole plant is cut off just below the head. Leaf lettuce can be harvested by cutting off the entire plant, but many gardeners prefer to harvest it by removing the larger leaves, leaving the smaller, center leaves to develop further. In this way repeated harvests can be made from the same plants.

Types and Varieties

There are five types of lettuce in common use in this country—leaf, crisphead, butterhead, cos (romaine), and stem lettuce.

The leaf varieties do not form heads, their leaves are large and crumpled and have wavy or frilled margins. Because they withstand hot weather better than the heading types, they can be grown at lower altitudes. They are also better adapted to dry-land culture. Grand Rapids, the best known loose-leaf variety, is fairly well adapted to this region; however, its leaves are coarse and its quality is only fair. Early Curled Simpson (White-Seeded Simpson) withstands heat and drought somewhat better than Grand Rapids and is of better quality.

Crisphead varieties form solid, cabbagelike heads. The interiors of well-formed heads are almost white, very crisp, and tender. They will not withstand much heat, and in this region they are best adapted to sections having altitudes of 5,500 feet or more. This is the type of lettuce commonly marketed as "Iceberg"; however, the true Iceberg is a distinct variety not adapted to this region. There are numerous varieties of crisphead lettuce of which Great Lakes, New York No. 12, Imperial 44, Imperial 456, and Imperial 847 are well adapted to this region. Hanson, one of the older crisphead varieties, is also fairly well adapted.

Butterhead varieties form heads which are more or less spongy or bunched rather than cabbagelike. The inner leaves of the heads blanch to a very light yellow and feel oily or buttery to the touch. Butterhead varieties are not well adapted to this region, but because of their high quality many people prefer them to the crisphead type. Big Boston and May King are the two most reliable varieties with respect to heading.

Cos, or romaine, varieties form long, narrow, upright heads; the leaves are folded together rather than bunched, as in the butterhead type, or smoothly overlapping, as in the crisphead type. They are not adapted to hot weather and should be grown only at altitudes of 5,500 feet or more. By many people cos lettuce is considered superior in quality to any of the other

types. Paris White and Dark Green are the most popular varieties.

Recently a stem-type lettuce has been introduced into rather general culture in the United States. Although its leaves are edible, it is grown for its thick, fleshy stems, which are peeled and eaten like celery. It is well adapted to this region and withstands heat better than the heading types. Celtuce is the only variety.

MUSTARD

Mustard can be grown in most sections of the region (table 1) as an addition to the list of potherbs, or greens. This vegetable is usually cooked and prepared for the table like spinach. It is easily home-canned for winter use; in recent years canned mustard greens have become a common commercial product.

Mustard should be grown in the low-altitude sections of this region as either an early-spring or a fall crop, because it quickly bolts to seed during the hot weather of midsummer. At altitudes exceeding 5,500 feet it can be grown as a summer crop under irrigation or on soils naturally well supplied with water. Because mustard is very frost-resistant, seed may be sown as early in the spring as the ground can be prepared (table 2).

At harvest the whole plant is usually cut off near the ground; the older, coarse leaves are discarded and the remainder are cooked like spinach.

Fordhook Fancy (Ostrich Plume), Giant Southern Curled, and Tendergreen (Mustard Spinach) are the varieties commonly grown.

OKRA (GUMBO)

Okra, or gumbo, is cultivated for its fleshy seed pods. These are harvested while immature and used in soups, cooked and served like asparagus, fried, or used raw in salads. The pods may be preserved for winter use by drying or by canning. In cooking or canning, the pods should not be allowed to come in contact with iron, because with it certain substances in the seeds form a black compound which spoils the appearance of the finished product.

Okra is not well adapted to culture in this region, because it requires a warmer climate and longer season for its maximum development. By the selection of suitable varieties, however, it is possible to grow it for home use up to altitudes of about 6,000 feet (table 1).

Culture and Harvest

Okra seed should be sown in the spring after the average date of the last killing frost (table 2). Okra can be grown with considerable success under dry-land conditions if there is a good supply of soil moisture in the spring so that the seed will germinate and the young plants will make a good early growth. However, if moisture is deficient, it may pay to soak the seed until the seed coat splits or for 48 hours before planting.

Okra pods should be harvested when they are young, tender, and crisp, or about 4 days old (fig. 21, A). If left on the plants much longer, they become fibrous and unfit for use and may also seriously stunt the plants. At harvest the pods with $\frac{1}{2}$ to 1 inch of the stem attached are cut from the plants with a sharp knife. They should be immediately stored under cool, moist conditions to prevent them from wilting. Gardeners can raise their own seed supply by allowing the pods on a few plants to become mature.

Varieties

Dwarf Green (Dwarf Long Pod Green) (fig. 21, B), the earliest maturing variety, is the only one that can be grown in the higher altitude sections; Perkins Mammoth Long Pod and White Velvet are later in maturing and therefore should be planted only at lower elevations.

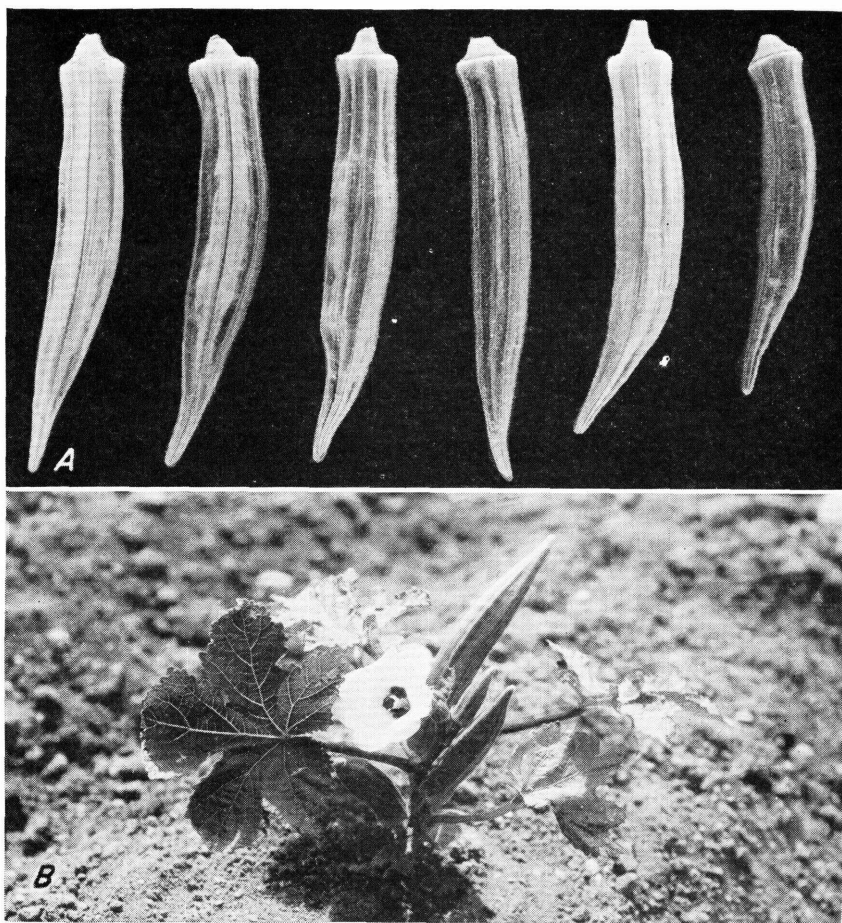


Figure 21.—A, Pods of Dwarf Green okra at proper size for harvesting; B, young plant of Dwarf Green okra showing a blossom, two pods suitable for harvest, and one pod past the edible stage.

ONIONS

Onions are among the most popular home-garden crops. By proper selection of types and varieties they can be grown in practically all sections of this region (table 1). Most discussions of onion culture deal only with bulbs of the common onion, but because this type is available only during certain months it will be explained how a nearly continuous supply of onions can be obtained from the home garden.

In early spring and during the summer, before the bulb-type onions are ready for harvest, there are several types of so-called bunching onions any one of which can be grown to take the place of the ordinary onion. These are the Welsh (White Welsh, Ciboul), the Perennial Tree (Egyptian), and the multiplier (potato). The Welsh is sometimes sold as a "multiplier," but the true multiplier is a distinct type. These onions can be used in practically the same manner as bulb onions in cookery or may be eaten raw. They are heat-tolerant and frost-hardy and therefore can be grown at all except the highest altitudes.

Also as a supplement to the onion supply at high altitudes or as an early-maturing crop at lower elevations, onions can be grown from sets of the ordinary, or bulb, onion. Such sets are merely small onion bulbs, which can be used to produce young bunching onions or mature bulbs. In most of the region this type can be grown at altitudes well over 6,000 feet.

Ordinary, or bulb, onions can be grown from seed or from transplants in practically all sections having an altitude less than 6,000 feet. The culture of each type of onion will be described separately (table 2).

Welsh Onions

Welsh onions are fairly hardy perennials, which can be propagated by seed or by divisions from mature plants. Many people consider them superior in tenderness and milder in flavor than either the Perennial Tree or the multiplier type. They are hardy up to altitudes of about 5,500 feet, but at higher elevations they should be given protection in winter. Once established, they will live for years and therefore should be planted with the other perennial crops. If seed is used in propagation, it should be sown in the open ground in early spring. The plants are ready for use at any time after they reach the size of a pencil; those not harvested the first summer can be left in the ground for an early-spring supply the next year. Mature plants multiply rapidly by sending up from their crowns shoots that form a cluster of plants. These clusters may be divided, and the individual plants may be reset to enlarge the bed or used as bunching onions. No true bulb is formed, but the slightly enlarged base of the plant and the lower blanched portion of the stem are the edible parts.

Welsh onions are sold as White Welsh, Early White Welsh, and Welsh Winter, but probably all of these names refer to one variety. Some seedsmen also list Japanese Long Bunching (Giant Chinese Green Bunching), which is very similar to the Welsh and is given the same cultural treatment.

Perennial Tree Onions

As the name implies, Perennial Tree (Egyptian) onions should be planted in the perennial garden. They are propagated by small bulblets, which form in bunches on the tops of mature plants (fig. 22). These can be obtained from seed houses or from established plantings. They are usually planted in August, 2 to 3 inches apart in furrows 4 to 5 inches deep and covered to a depth of about 2 inches. As the plants grow, the furrows are gradually filled in until they are level with the rest of the garden. Growth starts early in the spring, and the young, tender plants can be pulled for bunching onions. If some plants are left at 1-foot intervals in the rows, during the first or the second summer they will send up seedstalks on which the bulblets, sometimes mixed with flowers, are borne. These bulblets in turn should be planted as just described; thus a constant supply of this type of onion is assured. The mother plants which have been left to produce the bulblets should be lifted and divided



Figure 22.—Tops of Perennial Tree (Egyptian) onion showing small bulblets used in propagation.

every 2 or 3 years to prevent them from becoming root-bound. Perennial Tree onions are grown mainly for the blanched portion of the plants, which are used as bunching onions; but the bulbs formed at the base of the mother plants can be used in cooking.

Perennial Tree (Egyptian) onions are perfectly hardy and can be grown in all parts of this region. Two kinds are commonly listed—the red and the white; the white is the more popular. Many seedsmen simply list this type of onion as top sets, winter onion sets, or perennial sets.

Multiplier Onions

Multiplier (potato) onions, which are also perennials, should be planted in the perennial garden. They are propagated by bulbels, or bottom sets, which form around the base of mature

plants and resemble small common onions. These can be obtained from seed houses or from established plantings. If planted as described for the Perennial Tree, they will produce small bunching onions the following spring. A few of these plants left in the row at approximately 2-foot intervals will increase in size during the summer and in the second year will divide to produce small bulbels suitable for raising bunching onions. These new bulbels are obtained by lifting the old plants and breaking them away from the mother bulbs. If the mother bulbs are reset after the bulbels have been removed they will again divide, thus assuring a continuous supply. Some gardeners harvest as green onions the small plants which form around the mother plant in the second year. If some of these are left on the mother plants, they may be lifted in the fall, separated from the mother bulbs, and used in cookery. Multiplier onions are fairly hardy but should be given some protection at the higher altitudes.

Two or three kinds of multiplier onions are known, but they differ chiefly in color of the bulbs. Most seedsmen list them simply as multiplier, or potato, sets and do not specify the kind or color.

Mature Bulbs from Sets

Sets for growing mature onion bulbs are produced commercially by planting seed of certain onion varieties so thick that the bulbs cannot reach full size. The sets should be planted in the spring as early as the ground can be prepared. They will produce bunching onions early in summer, or they may be left to produce large, mature bulbs for winter use.

Sets (table 1) are usually sold as red, white, yellow, and Ebenezer. The Ebenezer variety is best if mature bulbs are desired for winter storage. The white and yellow sets are preferred for summer use.

Mature Bulbs from Transplants and Seed

The production of mature onion bulbs from sets just described is the method preferred for home gardens in parts of this region having short growing seasons. However, for sections having sufficiently long growing seasons, somewhat larger, better bulbs and more varieties may be had by sowing seed directly in the open ground or by using seedlings, or transplants, started under cover. The use of transplants is preferred for home gardens in all but the most southerly section of this region or at altitudes of less than 5,000 feet elsewhere.

Culture, Harvest, and Storage

When the direct-seeding method is to be used, the seed should be sown as early in the spring as the ground can be prepared. If it is sown thin, there is no need for a general thinning of the plants and the few thick bunches that do appear can be thinned by using the small plants as green, or bunching, onions (table 2).

Onion seedlings, or transplants, are produced by sowing seed indoors during late February or early March. Seed should be

sown thin so that it will not be necessary to transplant the seedlings to other boxes as is done with such crops as tomatoes. If good growing conditions are provided, the seedlings should be about the size of lead pencils by the time they are set in the garden. They are fairly frost-resistant, and as soon as danger of killing frosts is past they should be set in shallow furrows 1 to 1½ inches deep and watered immediately (table 2). Subsequent culture is the same as for the crop grown from direct-field seeding.

Onions, which have rather small root systems, cannot compete with weeds, but all cultivation should be shallow. The crop is fairly well adapted to dry-land culture on naturally moist soils; however, because of their small root systems onions cannot forage far for water, and irrigation is therefore beneficial. In southerly or low-altitude sections irrigation may be continued throughout the entire growing season. At higher elevations water should be applied sparingly during the latter part of the growing season to hasten maturity of the bulbs.

Onions are mature and should be harvested when their tops begin to lose their dark-green color and fall over. If they are not harvested soon after this stage is reached, second growth may start and spoil the bulbs for storage. At harvest, onions are pulled and laid in rows until the tops have completely dried; the tops are then taken off and the bulbs should be put into open-mesh bags or crates, covered, and left in the field or an open shed for a week to 10 days to cure thoroughly before they are put in storage. Storage for onions should be dry and cool but at above-freezing temperatures.

Varieties

There are two general types of common, or bulb, onions, the American and the foreign, or Spanish, type. The American type as a rule has smaller bulbs, stronger flavor, and firmer flesh and keeps better in storage. Widely separated tests in this region have demonstrated that at least three of the Spanish varieties—Early Grano (Babosa), Early Yellow Sweet Spanish, and the Utah strain of Yellow Sweet Spanish—are considerably earlier in maturing than any of the American varieties. Early Grano is the earliest maturing variety known. Its bulbs are top-shaped, small to medium-sized, mild-flavored, and tender-fleshed, but they do not keep well in storage. Early Yellow Sweet Spanish is top-shaped, medium-sized, mild-flavored, very tender-fleshed, and yellow-skinned. It is not a good storage variety, but it is somewhat better in this respect than Early Grano. The Utah strain of Yellow Sweet Spanish is globe-shaped, large under good growing conditions, mild-flavored, tender-fleshed, and light-yellow-skinned. Well-matured bulbs keep for 3 to 4 months in good storage. The three varieties just described may be expected to mature their bulbs up to altitudes of 6,000 feet if grown by the transplant method.

Mountain Danvers and Yellow Globe Danvers are varieties of the American type. Both are globe-shaped, medium-sized, medium- to strong-flavored, thick-skinned, and yellow. They are excellent storage varieties. Mountain Danvers, at least, is

especially well adapted to conditions in western Colorado. Southport White Globe also is an American type. It is globe-shaped, medium-sized to large, fine-grained, solid, fairly mild-flavored, and white-skinned and keeps fairly well in storage. None of the American-type varieties can be relied on to mature their bulbs at altitudes in excess of 6,000 feet, except in the southern part of the region.

ORACH

Orach (tree spinach, mountain spinach, Gartenmelde) is an ideal greens crop for this region (table 1). It thrives equally well at high and low altitudes and on dry land about as well as under irrigation. It is of special value in the low-altitude sections where spinach bolts to seed without forming an edible product. It has a softer texture than spinach, and many people consider it superior to the latter in flavor.

Culture and Harvest

Orach is usually seeded directly in the garden where it is to be grown, but plants can be started indoors, as described for cabbage, and set in the garden after danger of killing frost is past. Seeding can be done about 5 days before the average date of the last killing frost. It is sown in the same manner as spinach (table 2). Thin seeding will make a general thinning of the plants unnecessary, but if they stand closer than 2 inches the extra plants should be removed. Normal irrigation is beneficial, but orach does well on dry land.

Orach may be harvested when the plants are about 6 inches in height (fig. 23, A), or they may be left to grow to maturity (fig. 23, B). If harvested when young and tender, the whole plant can be cooked for the table or canning. Harvesting from older plants is done by stripping off the leaves. Half-grown leaves such as those from the midportion of the plants are best. Most gardeners prefer a combination of these two harvesting methods. The first harvest is made when the plants are about 6 inches in height, and plants are left at about 3-foot intervals in the row to grow to maturity. Such plants serve as a continuous supply of greens until killed by fall freezes. At altitudes of 6,300 feet or less, they will also mature seed for future use. Figure 23, B, shows a plant bearing seed at the tips of the branches.

Varieties

Triumph is the most popular variety and the one most commonly grown in the region. It produces an abundance of large, thick, plain, or nonsavoyed, green leaves. The variety Green Double Headed is very similar to Triumph, but its leaves are savoyed, or crumpled; because of its more branched habit of growth it is somewhat more productive. Gelbe (White, Yellow) is a yellow-leaved variety popular in France but not well adapted to this region. There are also red-leaved types of orach often used as ornamentals. They may also be used for greens, but the cooked product is not so attractive as that from the green or yellow-leaved varieties.

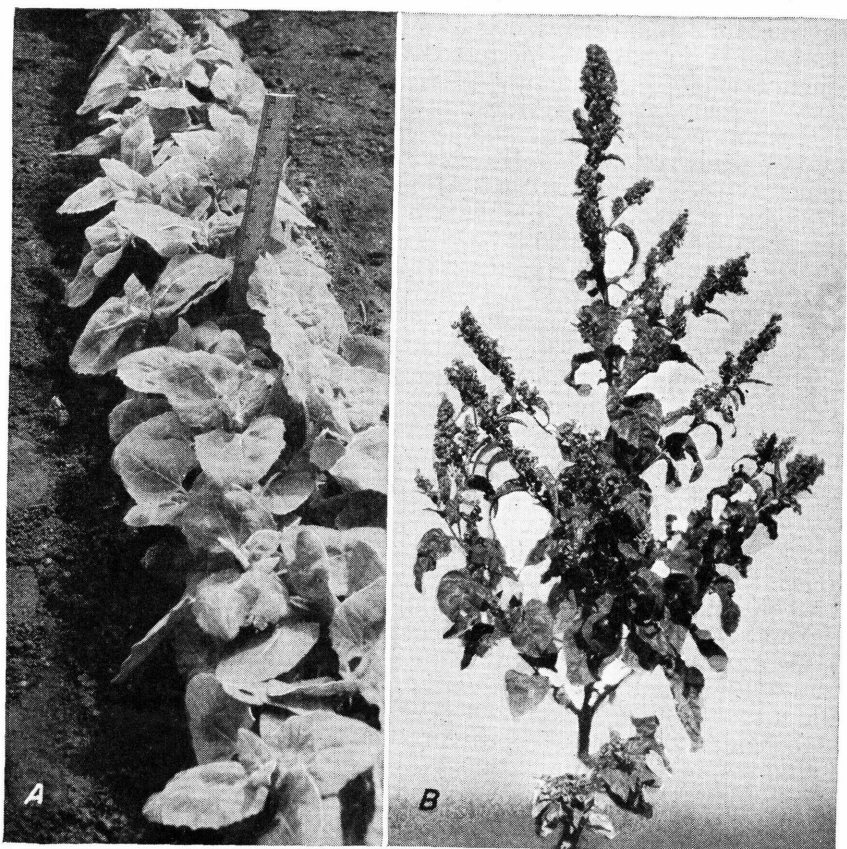


Figure 23.—*A*, Seedling orach plants at proper size for first harvest; *B*, full-grown plant of Green Double Headed orach, showing abundance of foliage suitable for greens during the summer and seed being produced at the tips of the branches.

PARSLEY

Parsley is a popular garden crop, grown for flavoring and for garnishing many dishes. It is tolerant to a wide range of climatic conditions and can be grown in practically all sections of this region. There are three types of parsley, of which the curled-leaved type is the most popular in the United States, largely because of the attractiveness of its leaves for garnishing. The second, or plain-leaved, type is equally hardy and well-flavored. It may be used in the same manner as the curled-leaved type, but it is not so attractive. The third type, known as Hamburg, or turnip-rooted, parsley is grown for its root, which is used mainly for flavoring stews and soups. It is not so well adapted to the higher altitudes of the region as the other two types.

Culture

Parsley is fairly hardy and slow germinating, but it is usually seeded directly in the garden 5 to 10 days before the last killing frost is expected (table 2). Plants can also be started indoors

in the same manner as celery and transplanted to the garden. As parsley is not well adapted to dry land, one or two irrigations greatly improve its quality. Harvesting for home use is accomplished by pulling or cutting off a few leaves as needed; the younger or undeveloped leaves and the leaves at the base of the plant should not be harvested. Plants potted in the fall make attractive house plants and provide a continuous supply of leaves throughout the winter. Roots of Hamburg parsley are harvested and stored like beets.

Varieties

Moss Curled (Double Curled, Triple Curled) is the best known of the curled-leaved type, although the relatively new varieties Evergreen and Paramount have shown considerable promise (table 1). The plain-leaved type is usually sold simply as Plain, or Smooth-Leaved. The turnip-rooted type of parsley is sold under the name Hamburg.

PARSNIPS

Parsnips, boiled or steamed until they are tender and then fried to a golden brown, are considered by many people to be one of the most delicious of all vegetables. Their distinctive flavor also makes them valuable for flavoring soups and stews. Unfortunately they are a long-season crop, and the half-long- and long-rooted types cannot be grown in this region at altitudes much in excess of 6,000 feet. The round-rooted type, which is considerably earlier maturing than the others, is practically unknown in the United States.

Culture, Harvest, and Storage

In all but the most southerly portion of this region, parsnips require the entire growing season to produce good-sized roots; for this reason the seed should be sown as early in the spring as the ground can be prepared (table 2). As it is slow germinating, radish seed should be mixed with it so that the quick-germinating radishes will mark the row and make early weeding possible. Thinning of the plants is easily done when they reach a height of 1 or 2 inches; later it becomes much more difficult. The crop can be grown on dry land in soils normally well supplied with moisture, but the roots are somewhat more fibrous and usually crooked and rough. Two or three irrigations are required for the best root development.

In commercial practice parsnips are often harvested in the fall before cold weather. This accounts for the flat, starchy taste of most parsnips sold in markets. For highest quality, parsnips require a period of cold weather during which much of the starch in the roots turns to sugar; it was once thought that they should be left in the ground over winter to permit this change. Research has shown, however, that if they are stored at a temperature of 32° to 34° F. for 2 or 3 weeks they are as sweet as if overwintered in the ground.

Parsnips shrivel and lose their quality rapidly in open-bin storage; therefore they should be stored in sand or dry garden soil as described for beets.

Varieties

Hollow Crown (Guernsey, Ideal, Student, Cup, and Sugar) is the most popular and most commonly grown variety in the United States. Its roots are 10 to 12 inches long and about 3 inches in diameter at the shoulder, from which they taper uniformly to a pointed tip. The crown, or top of the root, is sunken; from this fact the variety takes its name (fig. 24, *B*). It re-

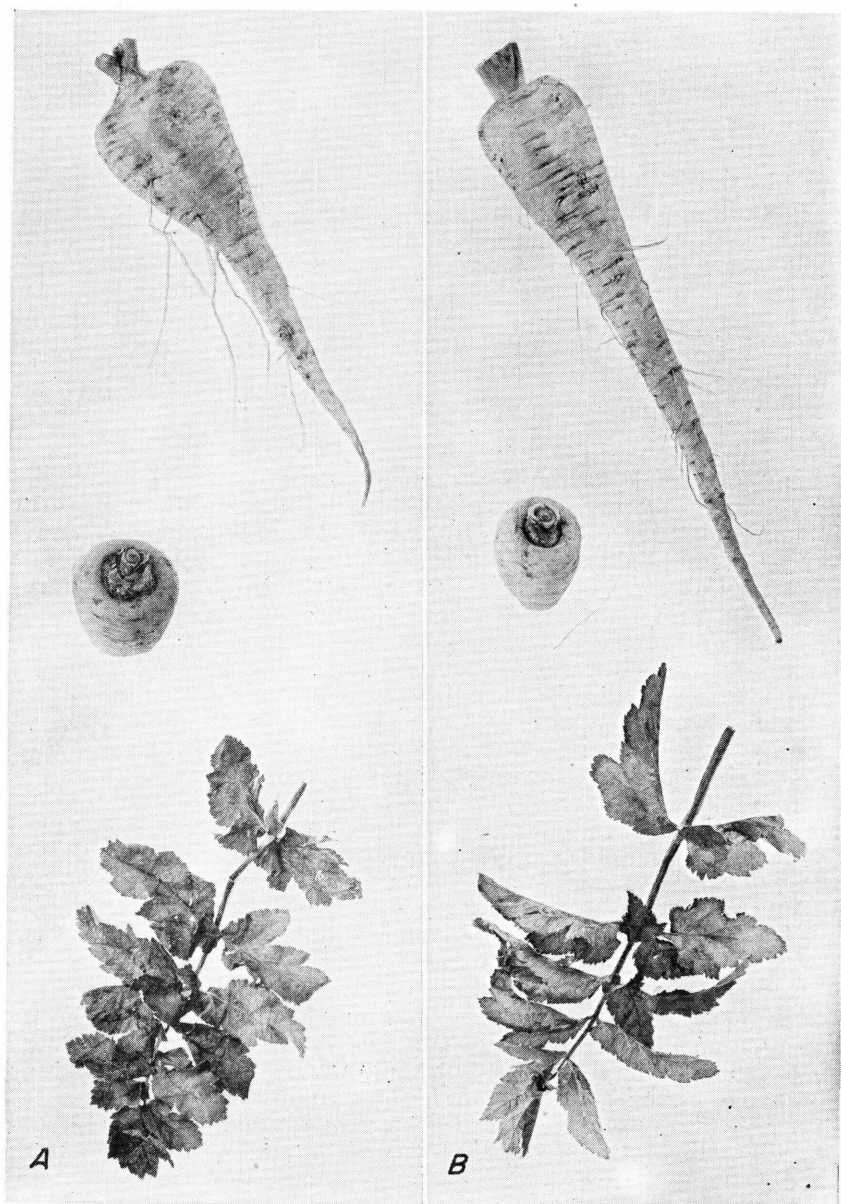


Figure 24.—Roots and leaves of two varieties of parsnip recommended for the central Great Plains: *A*, Short Thick; *B*, Hollow Crown (Guernsey, Ideal, Student, Cup, and Sugar).

quires 130 to 140 days to mature and therefore is best adapted to low-altitude sections. Newer varieties very similar to Hollow Crown are All American and Woodruffs Ace. Short Thick is not so well known, but tests in this region show it to be superior in quality to the longer types. Its roots are 6 to 8 inches long and about 3 inches in diameter at the shoulder; they taper rather quickly to the midportion of the root or have a tendency to be turnip-shaped (fig. 24, A). Short Thick matures in 100 to 120 days in most sections of this region but under exceptionally favorable conditions it may mature in about 80 days. It is especially recommended for sections having altitudes in excess of 5,000 feet (table 1).

PEAS

In this region peas thrive best at the higher altitudes or up to those where killing summer frosts frequently occur (table 1). For best results in the plains sections or at altitudes up to about 4,500 feet only the very earliest varieties should be planted, so that they will come into bearing before the heat of summer. Early varieties should also be selected for most sections having altitudes over 7,000 feet, because of the shortness of the growing season. Between these two extremes of altitude both early and late types may be grown with equal success.

Culture and Harvest

Peas should be sown in the spring as early as possible, but not so early that the young plants will be injured by late frosts. In the more favorable growing sections, succession plantings may be made at about 10-day intervals or early, midseason, and late varieties may be planted at the same time to provide for a succession of harvests (table 2). Trellises or supports made of chicken wire are sometimes provided, especially for the tall-vined sorts, to prevent the plants from being blown around by the wind. Although such supports do provide some protection and make picking easier they are not a necessity, because most varieties make considerably less vine growth in this region than, for example, in the North Central States.

Although early seedings of early varieties make fairly satisfactory yields under dry-land conditions, peas are better adapted to irrigation. Because continuous and fairly rapid growth are essential for high yields and quality, irrigations should be frequent but not so heavy that the soil becomes waterlogged, as this furnishes ideal conditions for the development of root rot, one of the most serious diseases of peas.

Peas should be harvested when the pods are well filled but before peas begin to harden. As most of the home-garden varieties mature their pods over a relatively long period, a more uniform, better grade of peas is obtained by successive pickings than from a single harvest. Peas lose their flavor rapidly after they are harvested if kept at ordinary temperatures; they should be used soon after they are picked or should be kept in a cool place.

Varieties

Although most people consider the smooth-seeded sorts inferior to the wrinkled-seeded varieties, some gardeners prefer

them for early plantings. Alaska is the variety most commonly grown, but Carters Eight Weeks (Radio) and Laxtons Superb (Early Bird, Improved Laxtonian) are also included in this group. The wrinkled-seeded, early sorts average but little later in maturity than the smooth-seeded varieties and are far superior in quality. In this group Little Marvel has been found to be one of the most reliable in filling and therefore is especially recommended for this region. Other recommended varieties of this group are Thomas Laxton, Laxtonian (Blue Bantam), World Record, and Gradus (Prosperity). Any of these varieties may be expected to succeed in this region if planted early, and all of them reach edible size in 60 to 70 days after planting.

In the midseason to late group Alderman is without doubt the most popular variety grown. It requires about 74 days to produce edible peas and therefore is a late variety for altitudes above 6,000 feet. Others in this group are Bliss Everbearing (76 days) and Telephone (74 days). The last variety has been largely superseded by Alderman, and many seedsmen do not distinguish between the two varieties.

In the late group such varieties as Champion of England (80 days), Stratagem Improved (Potlatch, Dwarf Defiance) (79 days), and Dwarf Telephone (Daisy, Carters Daisy) (79 days) are satisfactory. In general, these later varieties should be grown only in sections where the summer temperatures do not often exceed 90° F.

PEPPERS

By careful selection of varieties and provision of suitable growing conditions, peppers can be successfully grown in this region up to altitudes somewhat over 6,000 feet (table 1). In the plains sections or up to altitudes of about 4,500 feet practically all varieties can be grown. At altitudes between 4,500 and 6,000 feet the choice of varieties begins to assume more importance and at those over 6,000 feet only the earliest maturing varieties can be expected to succeed. Where the pepper can be grown, it is one of the choicest crops for the home garden. The fruits of the sweet-fleshed varieties are used raw in salads or are cooked and stuffed with various fillings; they are also used to flavor meats and pickles or to add color to pickles. The hot-fleshed varieties also are used in cookery, in pickling, and in making various types of hot sauces or relishes.

Culture and Harvest

Pepper plants should be started indoors 8 to 10 weeks before they are to be set in the garden (p. 15). Peppers are very easily injured by cold weather and frosts and should not be set in the garden until all danger of frost is past (table 2). Peppers are fairly drought-resistant and can be grown under dry-land conditions on the better types of soils. However, they respond to irrigation, especially at lower altitudes, and are benefited by fairly liberal applications of water throughout the growing season. At higher elevations water should be used sparingly after the plants bloom or maturity may be seriously delayed.

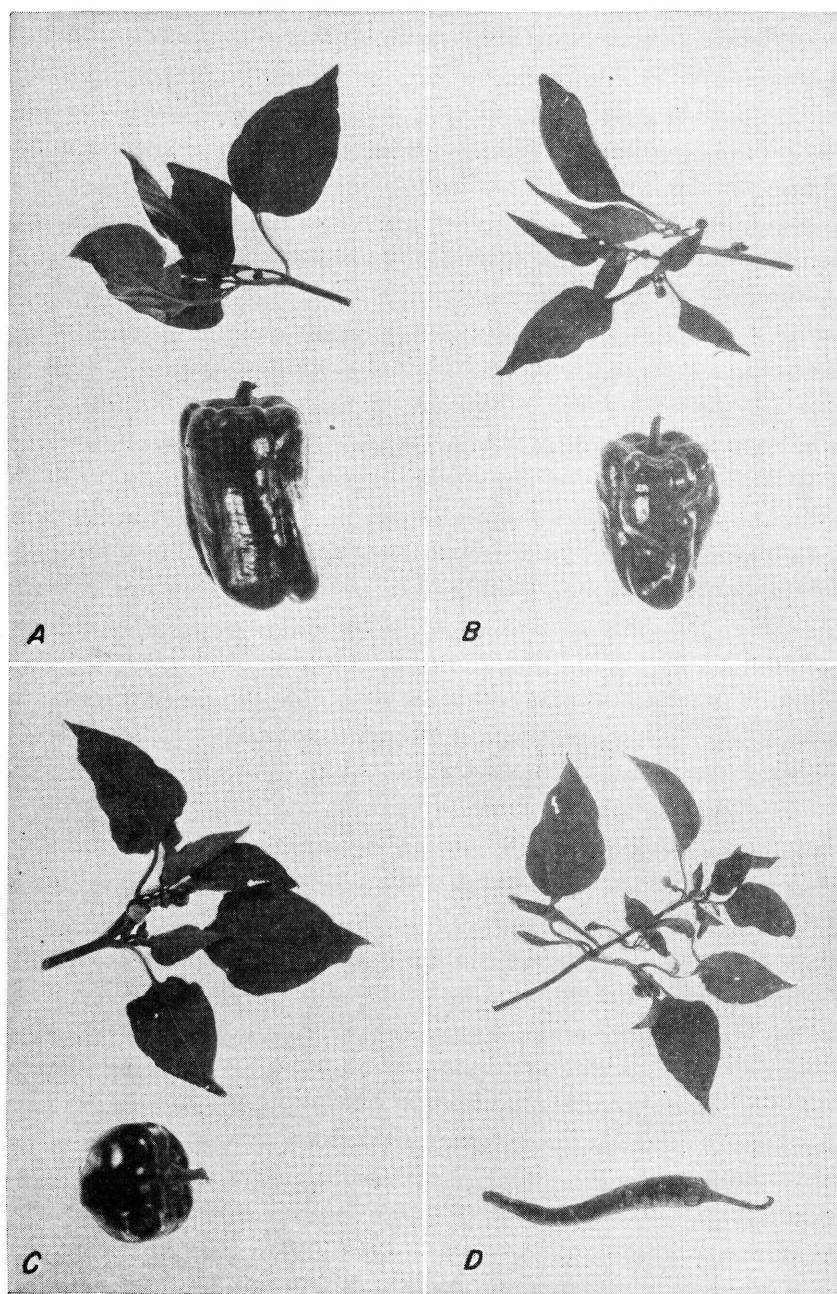


Figure 25.—Foliage and representative fruits of four varieties of pepper: *A*, California Wonder, a sweet, large-fruited variety for stuffing; *B*, Harris Early Giant, a sweet, medium-sized variety for stuffing; *C*, Sunnybrook, a sweet-fleshed variety of the pimento type; *D*, Long Red Cayenne, a pungent-fleshed, or hot, variety.

Sweet, or bell, peppers are usually picked when they have reached full size and have become fairly firm, but before they start to change color. If allowed to stay on the plants, they will turn red or yellow according to variety and the flesh will become less crisp and the skin tougher. Contrary to the opinion of many people, peppers do not become more pungent after they change color and sweet peppers cannot be distinguished from hot peppers by color, as both types include red and yellow varieties. As a rule, the pimento type of pepper, which is usually sweet-fleshed, and the hot peppers are left on the plants until they mature, or are colored.

Varieties

Of the sweet, or bell, peppers Early California Wonder, Ruby King, California Wonder (fig. 25, A), World Beater, Golden Queen, and Chinese Giant can be grown in the plains sections or up to altitudes of about 6,000 feet. Recommended for altitudes of about 6,000 feet are Windsor A, Neapolitan, Harris Early Giant (fig. 25, B), King of the North, and Bull Nose, listed in order of their earliness of maturity.

Of the pimento type Sunnybrook (Sweet Cheese, Tomato, and Squash) (fig. 25, C) and Perfection can be recommended for all sections having altitudes not much exceeding 6,000 feet.

There are many varieties of hot peppers. Some are long and tapering, others oval, and still others round; also there are both red and yellow varieties. Usually they are comparatively small-fruited, but there are even fairly pungent strains of Bull Nose, which is generally classified as a sweet-fleshed variety. As a rule they are rather late maturing, and only the earliest varieties should be grown at altitudes nearing 6,000 feet. It should be remembered, however, that the immature fruits are just as pungent as mature ones and, if properly dried, they can be used in the same manner in cookery; for this reason they are recommended for trial even at relatively high altitudes. The varieties recommended, in order of their earliness of maturity, are Hungarian Yellow Wax, Long Red Cayenne (fig. 25, D), and Large Cherry.

POPCORN

Popcorn, a favorite dish with many people, can be available throughout the winter months. This crop is easily grown up to altitudes of about 6,000 feet, but at higher altitudes the growing season is usually too short for good development and maturity of the ears. In general, however, by the selection of properly adapted varieties it can be grown in the same range of climatic conditions as sweet corn (table 1). A major difficulty in growing popcorn is that it crosses easily with other types of corn planted nearby; such crossing may affect its popping. For this reason it should not be planted near other types of corn; if there is any chance that it has been cross-pollinated, the gardener should not save seed for planting.

Culture, Harvest, and Storage

The culture of popcorn is similar in all respects to that of sweet corn (table 2). It is fairly well adapted to dry-land

culture, but the crop will be greatly increased if one or two irrigations can be made. To hasten maturity, water should be withheld in the latter part of the growing season or applied very sparingly after the ears are formed.

Popcorn should not be harvested until it is completely mature; even then it must be dried before it will pop. When it is allowed to dry naturally, 1 to 2 months is required before it will pop properly. This period can be shortened by putting the ears in a dry, warm room or behind a stove for a few days. However, corn that is too dry will not pop any better than corn that contains too much moisture. Perhaps the best recommendation is to dry it for a few days in a warm room immediately after harvesting and then to store it either shelled or on the cob in a shed or bin exposed to outside air. Once the corn has reached the best popping stage, it can be stored in airtight cans or other containers for a considerable period without losing its ability to pop.

Varieties

Japanese Hulless (Australian Hulless) is the earliest maturing variety of popcorn. It produces short, small, white-kerneled ears. White Rice matures in midseason and produces rather large ears. The kernels are sharp-pointed and white. South American (T.N.T., Giant Yellow) is recommended as a yellow-kerneled variety for sections with low altitude. It is 10 to 15 days later in maturing than Japanese Hulless and slightly later than White Rice. When popped, it is creamy white. The popped corn of all varieties is of good quality, but they differ in the amount of cob chaff adhering to the kernels. Japanese Hulless has the least chaff and therefore is often preferred for home growing.

PUMPKINS (WINTER)

Botanically pumpkins include both the common, or winter, pumpkin and the vegetable usually called summer squash. Winter pumpkins are discussed here, and summer squashes are discussed on page 84.

Culture, Harvest, and Storage

Pumpkins (winter) can be grown successfully in all sections of the region up to altitudes of about 6,500 feet by proper selection of varieties (table 1). Their cultural requirements are similar to those of cantaloups (muskmelons) except for spacing distances between plants (table 2). Pumpkins are drought-resistant and will succeed on dry land where other crops would fail. However, they do respond to irrigation, especially at blooming time, by setting a greater number of fruits. At altitudes of about 6,000 feet water should be used sparingly after the fruits have set or maturity may be too much delayed. An even spacing of the plants in the row is preferred to the hill method of culture, especially for dry-land conditions. Pumpkins should not be harvested until the skin, or shell, of the fruits and the stem are definitely hard and difficult to penetrate with the thumbnail. If fully mature they will keep until midwinter in dry, cool storage.

Varieties

The Cheyenne Bush pumpkin, the earliest maturing variety, can be grown up to altitudes well over 6,000 feet. Its fruits strongly resemble those of New England Pie (Sweet Sugar), but are somewhat smaller and have thicker flesh. The plant is strictly a bush type, or grows upright, thus making it ideal for home gardens. It matures about 75 to 80 days from seeding. Early Cheyenne (fig. 26) is a second-early variety, maturing in 90 to 95 days from seeding. It is a vining type, and its fruits also strongly resemble those of New England Pie; but both vines and fruits are smaller. Both Cheyenne Bush and Early Cheyenne will mature their fruits at altitudes of 6,300 feet. New England Pie matures its fruits in about 100 to 115 days.

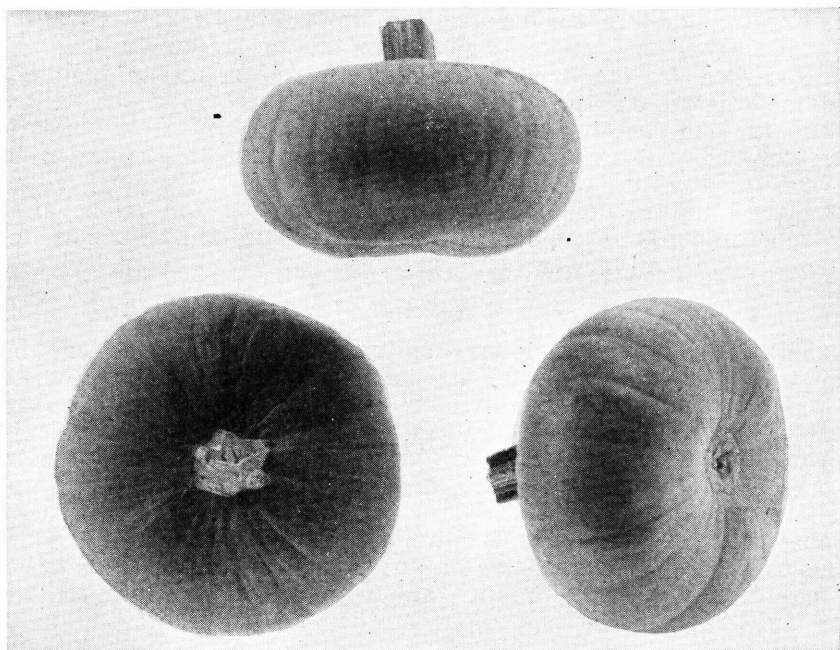


Figure 26.—Typical fruits of the Early Cheyenne pumpkin.

It has a medium-sized vine; the fruits are round and flattened at the ends and measure 8 to 9 inches in thickness and 10 to 12 inches in diameter. It will mature its fruits up to altitudes of about 6,000 feet. Winter Luxury, a strain of New England Pie, is somewhat similar to it except that the skin is light orange and slightly netted. It matures at about the same time as New England Pie but does not keep so well in storage. Of the larger fruited, later maturing varieties Connecticut Field and Large Cheese (Kentucky Field) are worthy of trial up to altitudes of about 6,000 feet.

RADISHES

Radishes are among the most rapid-growing vegetables. Roots of edible size are produced within 3 to 4 weeks from time of

seeding. However, for production of edible roots in a large part of the region it is essential that seeding be done as early in the spring as possible and yet avoid killing frosts. The plants will produce good roots in the spring, but as the days become longer and the temperatures higher they produce seedstalks very rapidly and roots are not formed or are of poor quality.

Culture and Harvest

Radishes are seeded directly in the garden. Germination takes place rapidly if soil moisture is adequate and the seed is not planted more than one-half to three-fourths of an inch deep (table 2). Thinning is not necessary because as the larger radishes are harvested more space is available for the smaller ones left in the soil. Three or four 10-foot rows sown at 1-week intervals should provide enough summer radishes for an average family.

Radishes are adapted to dry-land culture. A constant supply of moisture is necessary for production of roots; if the soil is allowed to dry out they become pungent and pithy or soft. However, because they reach edible size in such a short period, the total quantity of irrigation water necessary is very small.

Harvesting is done as soon as the roots reach edible size, but before they become pithy and soft. The optimum size depends upon the variety being grown.

Varieties

There are many varieties of radishes, all of which can be grown in any section of the region (table 1). Early Scarlet Globe, Sparkler, Crimson Giant, and Saxa (Rapid Red) are excellent round red or red-and-white varieties. White Icicle is probably the best white variety that can be grown. It produces roots 5 to 6 inches in length and tapers to a point at the tip. There are also several varieties of radishes that can be used for winter storage. They are mostly long varieties—7 to 12 inches in length—and mature approximately 8 to 10 weeks after seeding. Long Black Spanish and China Rose Winter are two of the better varieties. They can be stored successfully in a manner similar to that used for other root crops.

RHUBARB

Among the perennial vegetables few are more worthy of culture than rhubarb. The leaf stems are excellent for pies and sauce and are also frequently mixed with fruits to add flavor and tartness to preserves. Rhubarb can also be canned for winter use.

Culture and Harvest

Rhubarb is propagated by root divisions, which can be obtained from seed houses or from an established bed by lifting and dividing the old plants. One large plant, three or more years old, can be divided into three to six individual smaller plants. The rhubarb plant forms a large mass of intertwined, fleshy roots and several individual growing points. Division should be made in the spring, preferably before much top growth is visible,

by lifting and cutting up the old roots so that each growing point is attached to at least one root. These single roots are set upright in a trench of sufficient depth so that their tops are covered with 2 or 3 inches of soil when the trench is filled. The soil should be well packed around the roots, which should be watered immediately unless the soil is very well supplied with moisture. As rhubarb is a perennial, it should be planted at one edge of the garden with other perennials such as asparagus (table 2).

Rhubarb can be grown without irrigation, but its quality is greatly improved by two or three applications of water, especially in early summer, when it is making its most rapid growth. The planting should be kept free from weeds by shallow cultivation, and barnyard manure should be applied liberally every 2 or 3 years. Rhubarb should not be allowed to go to seed; all seed-stalks should be cut off as soon as they appear.

Harvesting is accomplished by pulling, not cutting, the leaf-stalks. Not more than a third to a half of the leafstalks should be removed at one harvest, and the plant should be given an opportunity to renew its normal size before another harvest is made. New plantings should not be harvested until they are 2 years old.

Varieties

Victoria (Myatts Victoria) is the variety most commonly grown at present. It grows vigorously and produces relatively large leafstalks, which are inclined to be greenish in color. Linnaeus (Strawberry) produces numerous bright-red leafstalks somewhat smaller than those of Victoria. It is only moderately vigorous but is preferred to Victoria for home gardens because of its tenderness and bright color. Several newer varieties have been introduced in recent years and are listed by some seed houses and nurseries. Among these McDonald is one of the most popular. It is a vigorous-growing variety and produces rather large leafstalks of good color. It is well adapted to this region (table 1) and is gaining in favor. Ruby, another of the newer varieties, does not seem to be adapted to this region. All varieties of rhubarb can be expected to make their best growth in this region in the medium- to high-altitude sections although they can be grown at lower elevations or in the southerly portion in partially shady, moist locations.

RUTABAGAS

Rutabagas, or Swedish turnips as they are sometimes called, can be grown in all the sections of the region (table 1), but they thrive best in sections having relatively cool summer temperatures or, in general, at altitudes greater than 4,500 feet. At lower elevations seeding should be delayed so that the crop will mature during the cool fall weather. By many people rutabagas are considered superior to turnips in flavor and quality; they have the further advantage of keeping better in storage.

Culture, Harvest, and Storage

In all but the most southerly and low-altitude sections of this region, rutabagas require the full growing season in which to

mature; they should therefore be planted about 5 days before the average date of the last killing frost (table 2). Thinning should be carefully done, because rutabagas are a long-season crop and the roots need ample space in which to mature. The

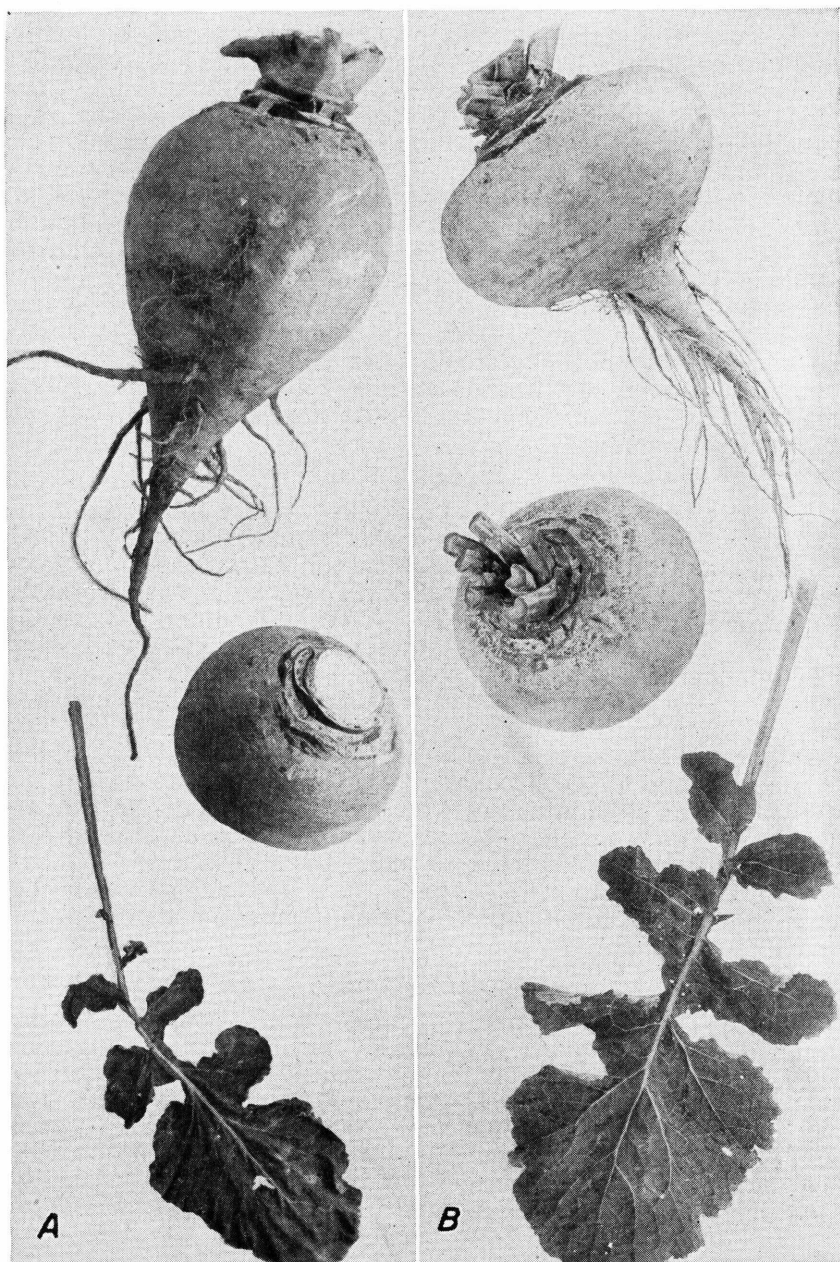


Figure 27.—Roots and leaves of two varieties of rutabaga recommended for the central Great Plains: *A*, American Purple Top; *B*, Early Neckless.

crop is not adapted to dry-land culture and should be irrigated frequently to produce good-sized, sweet-flavored roots. Harvesting is usually done in late fall; only medium- to large-sized roots should be saved for storage as they are usually tenderer and sweeter flavored than small ones. Rutabagas can be stored by the methods described for beets; in sand storage they keep perfectly for a year.

Varieties

The yellow-fleshed varieties of rutabaga are the most popular in this country, although apparently there is little difference in flavor and texture between them and the white-fleshed ones. American Purple Top (Long Island) is one of the best of the yellow-fleshed varieties (fig. 27, A). The root is large, globular to top-shaped, with medium-sized neck and small taproot. The flesh is firm, light yellow, and of excellent flavor. The skin is yellow, with purple shoulders. Early Neckless (Golden Neckless) (fig. 27, B) is another popular yellow-fleshed variety, somewhat earlier in maturing than American Purple Top. The root is medium-sized to large and of a flattened-globe shape. The flesh is fairly firm, light yellow, and of fair to good quality. The neck is short and small. The skin is yellow, with light-purple shoulders. Bangholm is similar to American Purple Top in shape, but the root is typically rougher and the neck is larger and coarser. It is claimed by some that the flesh of this variety is sweeter than that of other sorts. Sweet German (Macomber, Sweet Russian, and White Swede) is perhaps the best known of the white-fleshed varieties. The root is large and nearly globular, and the neck is relatively small. The flesh is somewhat less firm than that of American Purple Top, white, and sweet. The skin is white, with greenish-bronze shoulders.

SALSIFY

Salsify (oysterplant, vegetable-oyster) is one of the least known vegetables, but it should be grown to a much greater extent, especially in home gardens. There are three kinds of plants often referred to as oysterplants. The true salsify (vegetable-oyster), the one most commonly grown, is distinct from the others. The leaves are grasslike in appearance (fig. 28), and the roots are 8 to 10 inches in length, slender, and grayish white. Black salsify (*Scorzonera*) and Spanish oysterplant are rarely grown in the United States. Salsify is known as vegetable-oyster because when the roots are boiled with milk it is difficult to distinguish the flavor from that of oyster stew. It is also sometimes boiled and served like turnips or fried like parsnips.

To produce roots of good size, salsify requires a long growing season. Even at the lower altitudes, where the temperature range is fairly high, the crop must be seeded in the early spring for the roots to reach good size. At altitudes above 6,000 feet edible-sized roots are seldom obtained (table 1). The plants are hardy and will withstand considerable frost. Thinning should be done when the plants are an inch or two in height, as they are difficult to thin if they become much larger (table 2).



Figure 28.—Single plant of salsify (oysterplant, vegetable-oyster).

Salsify is deep-rooted and comparatively drought-resistant. Well-established seedlings will produce roots of fair size without irrigation, but two or three applications of water hasten growth and increase the size of the roots.

The roots can be harvested in the fall or throughout the winter, for they are not injured by freezing. At least part of them should be pulled and stored so they will be accessible when desired during the winter. Storing should be like that of beets.

The only variety listed by most seed companies is Mammoth Sandwich Island, the most satisfactory one to grow. The home gardener should be certain to obtain seed of true salsify rather than seeds of the other two types mentioned.

SPINACH

Spinach is recommended as a greens crop in the parts of the central Great Plains where it can be grown successfully (table 1). Unfortunately, however, it is not a dependable crop in the low-altitude or plains sections of the region. It is very susceptible to injury by high temperatures and in the sections indicated often goes to seed without forming an edible product. In such sections it is suggested that orach or Swiss chard be grown as a substitute.

Culture and Harvest

Spinach, which is fairly frost-hardy, can be sown as early in the spring as the ground can be prepared. Early seeding is especially important in the southerly sections of this region and at altitudes of less than 4,500 feet. If seeding is rather thin and even, no thinning is necessary until the plants are 3 to 4 inches in height or until they are large enough to be pulled as greens. Repeated thinnings of this nature considerably lengthen the harvest season (table 2).

Spinach is not well adapted to dry-land culture, but its growing season is so short that even one or two irrigations will do much to insure a crop. Harvesting is usually accomplished by

cutting off the entire plant just above the soil surface, but it can be done by pulling leaves from the plants as needed.

Varieties

Long Standing Bloomsdale (fig. 29, A) is perhaps the most popular variety of spinach. It is attractive, early maturing, and in the higher altitude sections, where it is best adapted, is fairly slow in going to seed. Juliana is very compact, slow growing, and slow in going to seed. In this region it does not go to seed as quickly as Long Standing Bloomsdale, but its slow growth is a handicap where hot weather comes early. The two varieties mentioned have crumpled leaves.

Of the plain-leaved varieties, Nobel (Giant Thick Leaved) is the most desirable (fig. 29, B), but King of Denmark is fairly long standing at altitudes exceeding 5,500 feet.

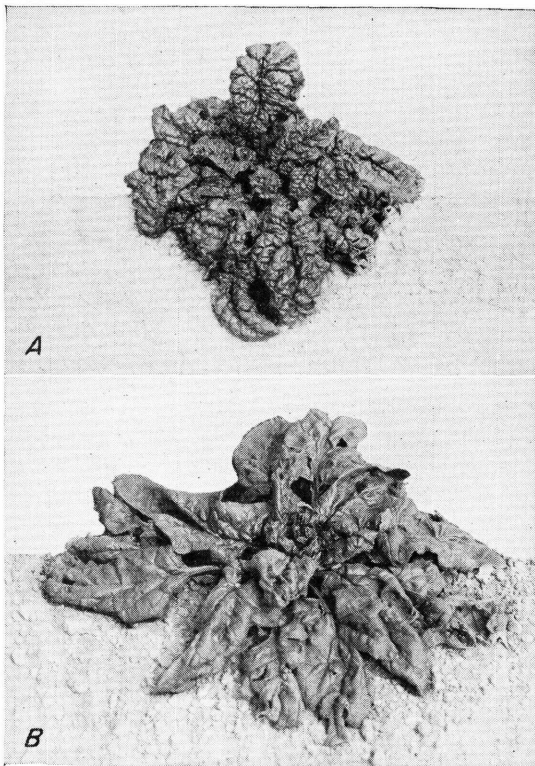


Figure 29.—Plants of two popular varieties of spinach: A, Long Standing Bloomsdale; B, Nobel (Giant Thick Leaved).

SPINACH (NEW ZEALAND)

New Zealand spinach, which is not a true spinach, is a valuable substitute for it in many parts of the region. However, it is a slow-growing crop and does not form an edible product until late summer or fall. Therefore, at altitudes much in excess of 6,000 feet it is not very satisfactory (table 1).

New Zealand spinach should be seeded in the garden as early in the spring as possible. As it takes considerable time for the seed to germinate, radishes are sometimes planted with it to mark the row until the plants are up. The plants are often 2 to 3 feet in breadth, therefore only a small amount of seed is needed per unit of row. To insure a good stand of plants it is best to plant an average of one seed every 6 inches. After the plants are approximately 4 inches high, the excess seedlings can be thinned out (table 2).

New Zealand spinach may be grown on dry land, but it is not especially well adapted to it. Unless some irrigation water is

available, the quality of the product is greatly reduced. In locations having climatic conditions similar to those of the Cheyenne Horticultural Field Station, two or three irrigations during the growing season are sufficient.

Plants of New Zealand spinach are open and spreading, with many branches and a large number of small leaves. The edible portions are the leaves and the ends of the branches. The most common method of harvesting is to cut off 4 to 6 inches of the tips of the branches. This is especially desirable as the season advances, because these parts are much tenderer than the older leaves. If the above practice is followed, a continuous source of greens is available until the plants are killed by frost.

There are no varieties of New Zealand spinach.

SQUASHES (SUMMER)⁵

Because fruits of summer squashes are eaten when immature, they do not require such a long season to reach edible maturity as do pumpkins, which must be allowed to ripen thoroughly on the vines. For this reason summer squashes can be grown up to altitudes at which the vines are prevented from developing normally by frosts or by low average temperatures (table 1).

Culture

The cultural requirements of summer squashes are the same as those of pumpkins, and these squashes are even better adapted to dry-land conditions. When grown under irrigation they should be given a moderate, continuous supply of water throughout the growing season to keep the plants in a fruitful condition (table 2).

Varieties

The white, flattened, scalloped-edged fruits and bush-type plant of Early White Bush Scallop (Patty Pan, Cymling) squash (fig. 30, A) are familiar to everyone. The fruits should be harvested when they are 4 to 6 inches in diameter or as long as the skin can be easily punctured with the thumbnail. Mature fruits are not edible. The fruits of Early Yellow Bush Scallop are identical with those of Early White Bush Scallop except for being deep yellow.

The Early Summer Crookneck, Giant Summer Crookneck, Giant Summer Straightneck (fig. 30, B), and Yankee Hybrid varieties bear elongated, club-shaped, yellow fruits more or less thickly covered with warts. The plants are of the bush type. Because of the difference in the size of the fruits of these varieties, it is difficult to set limits for harvesting. The fruits should be used before the skin begins to harden and can be used from the time they are 6 to 8 inches in length as long as the skin is tender. They are not edible when mature.

Cocozelle and Zucchini, two varieties representing the Italian marrow group, are well adapted to this region. There is little difference between these two varieties except in color and size of fruit. The plants of both are usually of the bush type, but a vining strain of Cocozelle is sometimes grown. The fruits are

⁵ The varieties listed here as summer squashes all belong to *Cucurbita pepo*, and from a botanical viewpoint they are pumpkins.

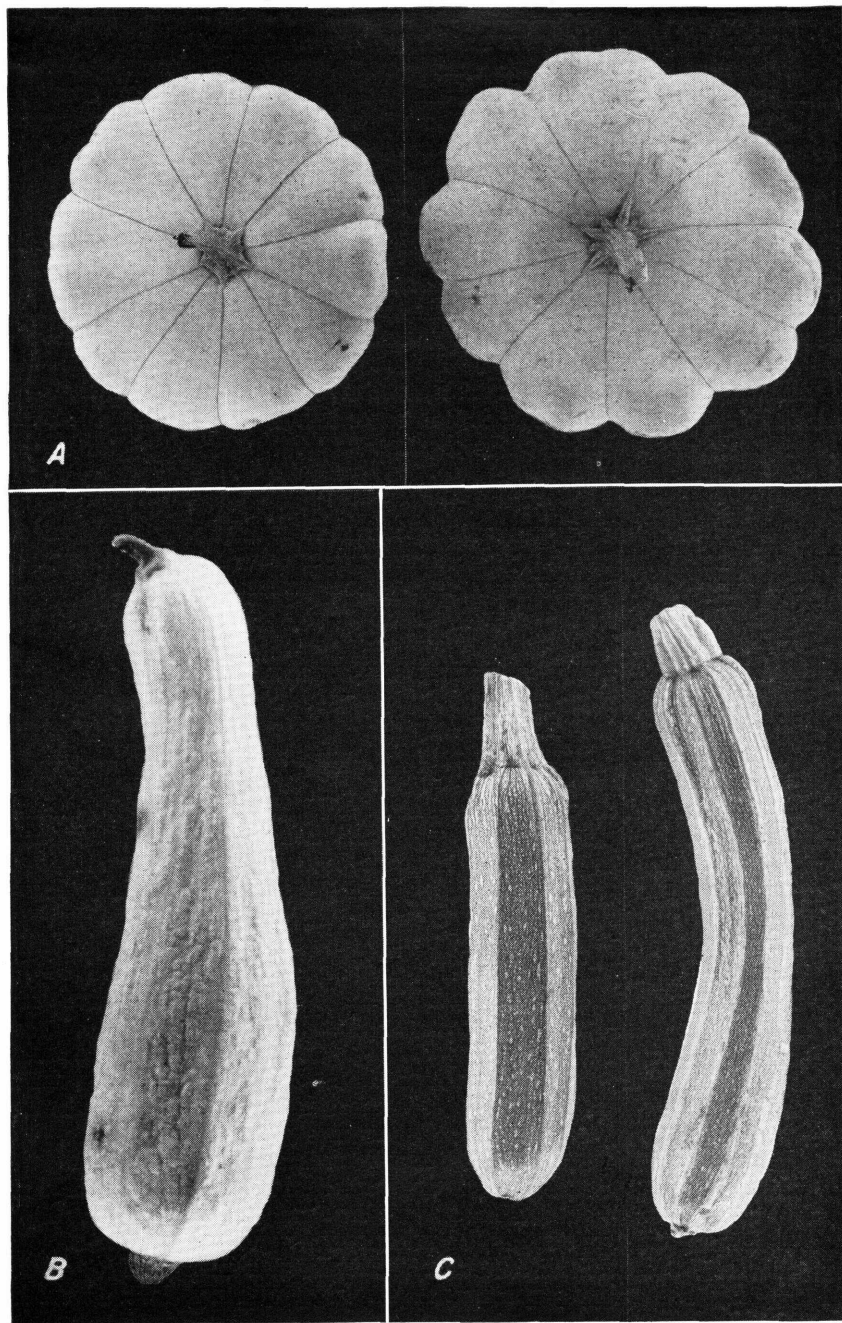


Figure 30.—Fruits of three varieties of summer squash: *A*, Early White Bush Scallop (Patty Pan, Cymling); *B*, Giant Summer Straightneck; *C*, Zucchini, of the Italian Marrow group, at best size for cooking, $\times \frac{1}{3}$.

elongated, 13 to 18 inches in length, and about 5 inches in diameter when fully grown. They are smooth or only slightly ribbed and are medium to dark green, striped or marbled with lighter green. They are hard-shelled and inedible when mature. The fruits are harvested when 6 to 10 inches long or before the shell begins to harden (fig. 30, C).

SQUASHES (WINTER)

True squashes are seldom eaten when immature, and therefore they require a longer season in which to reach an edible state than do summer squashes (table 2). For this reason their range of culture is much more restricted. Practically all varieties can be grown in the plains sections of this region or at the lower altitudes, but squash bugs, if not controlled, kill the plants. At altitudes greater than 6,000 feet even the very earliest varieties do not always mature their fruits.

Culture

The cultural requirements of winter squashes are identical with those of pumpkins; the same precautions should be taken concerning the application of irrigation water late in the season.

Varieties

The Hubbard group of squashes represents the most popular type cultivated in the United States today. It includes the Blue Hubbard, Improved Green Hubbard, Chicago Warty Hubbard, and Golden Hubbard (fig. 31, A) varieties. To these might be added Vermont Hubbard, a rather recent introduction by the Vermont Agricultural Experiment Station. This last-named variety is very similar to Improved Hubbard but somewhat more warty, thicker fleshed, and of better storage type. Any of these varieties can be grown in the plains sections or at the lower altitudes, but at elevations approaching 6,000 feet only the Golden Hubbard can be expected to mature its fruits consistently.

In addition to the Hubbard squashes, Arikara (fig. 31, B) is to be recommended as an early, large-fruited variety of fair quality and excellent for storage. Buttercup is another early variety that can be recommended especially for its high quality. The fruits of this variety weigh 3 to 5 pounds. The skin is green and thin, becoming hard when mature. The fruits are of good storage type. The flesh is orange yellow, very thick, fine-textured, dry, and sweet. By many this is considered the best flavored of all squashes. Banquet, which is very similar to Buttercup, is somewhat earlier maturing and more prolific. Both Buttercup and Banquet can be successfully grown up to altitudes of about 6,000 feet. In addition, Butternut, a new variety which is rapidly becoming popular for its high quality, is well worth a trial (table 1).

Table Queen (Acorn, Des Moines) (fig. 31, C) may be classified with the summer squashes, but it is most frequently used as a winter-type squash. Its vines are smaller than those of most winter squashes, and therefore it is better adapted to home-garden culture. The fruits are acorn-shaped and ribbed. The

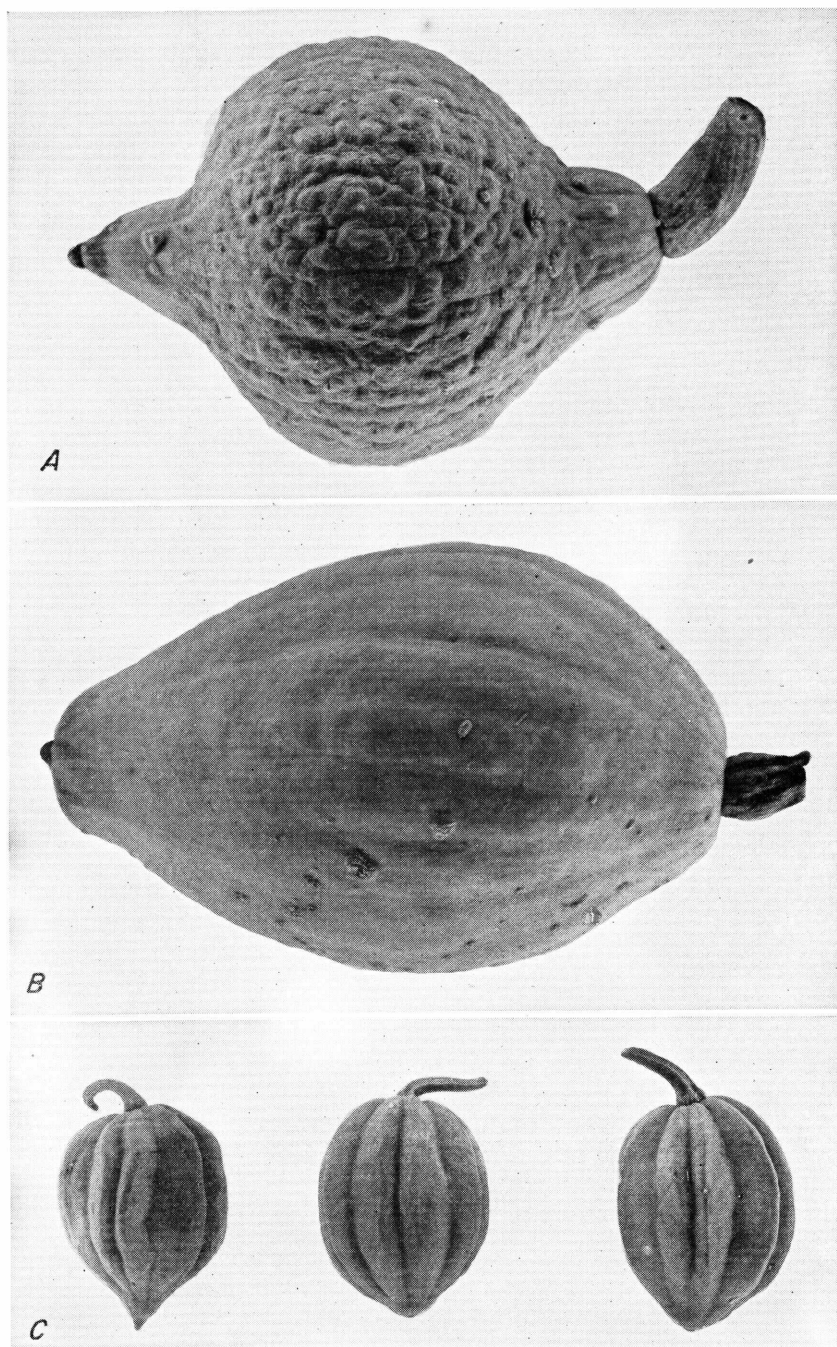


Figure 31.—Fruits of three varieties of winter squash: A, Golden Hubbard; B, Arikara; C, Table Queen (Acorn, Des Moines).

older strains are dark green and about 6 inches long by 4½ inches in diameter, but now yellow-skinned strains are available also. The shell is thick and becomes hard at maturity. The flesh of mature fruits is light yellow. The fruits are usually used when mature and are prepared for the table by splitting them lengthwise and baking. Sometimes they are used in the immature state, or before their shells begin to harden; in that case they are prepared for the table in the same manner as the Crooknecks. The mature fruits keep well in cool, dry storage.

TOMATOES

Tomatoes are the most widely grown and probably the most important home-garden vegetable. By careful selection of varieties they can be grown in practically all parts of the region up to altitudes at which summer frosts or low summer temperatures injure the vines (table 1). Their culture in this region does, however, present some difficulties not common or not so serious in other parts of the country. Thus, in the low-altitude sections many varieties are only partially able or totally unable to set fruit, perhaps chiefly as the result of high summer temperatures. On the other hand, at altitudes of 5,500 feet or more attention must be given to both fruit-setting ability and earliness of maturity.

Culture and Harvest

Although tomatoes can be seeded in the open ground in the most southerly section of this region, it is recommended that the home gardener raise early plants (p. 15) and set them in the garden after all danger of frost is past (table 2). From 6 to 8 weeks should be allowed for the growing of the seedlings; during this time it is important that they be kept growing steadily and normally at all times. Spindly, very tender plants are not desirable, but any check to the growth of the seedlings will delay maturity and lessen the early if not the total yields. Well-grown plants should be in bud by the time they are set in the garden.

Tomatoes are not adapted to dry-land culture. Under drought conditions the fruits ripen prematurely and are small and lacking in quality. However, irrigation must be carefully done or it may seriously delay maturity and reduce yields. In the low-altitude sections or in general at altitudes of less than 5,000 feet sufficient water should be supplied to keep the plants growing vigorously at all times. At altitudes of more than 5,000 feet irrigation becomes an increasingly important factor in tomato production. In such sections water should be supplied to keep the plants growing vigorously until they begin to set fruit. After this stage of growth has been reached, the supply of water should be reduced to that required to keep the plants from wilting. Experimental results have shown that a single irrigation given just as the fruits begin to ripen may delay maturity as much as 10 days. In the higher altitude sections such a delay often means failure to obtain ripe fruit.

Tomatoes are usually grown for ripe fruits. Harvesting should be done as soon as the fruits begin to show definite traces of color, because when they are left on the vines until fully mature they retard the ripening of the other fruits. Tomatoes are almost as worth while for the home gardener, however, as a source of green fruits. Full-grown, green fruits contain almost as much vitamin C as ripe fruits, and they actually can be used in more ways in cookery. They are valuable in numerous kinds of pickles, for making conserves, and for making tomato mince-meat that would fool "Mother" into thinking it genuine mince-meat. Many people consider fried tomatoes one of the choicest summer dishes. For these reasons the culture of tomatoes is recommended even for districts where there is little likelihood of obtaining ripe fruits.

The tomato harvest season can be considerably extended into the fall by several methods. One of the best means is to build a frame of boards around the plants, which can be covered at night or during cold days with burlap, canvas, or window sash (fig. 32). Another simple method is to nail small pieces of lumber on both ends of burlap sacks, making small covers which can be thrown over the plants. Such covers should be removed during the daytime to give the plants sunlight. If necessary, the entire plants, fruits and all, can be pulled and hung, roots up, in a cool cellar, where the fruits will sometimes remain edible for weeks.

Danmark (fig. 33) is a nonvining, or determinate, first-early variety, especially well adapted to low- and high-altitude conditions. At low altitudes and in the very southern part of the region it sets fruit better than any other variety thus far tested. On the other hand, it is early maturing and very consistently ripens at altitudes of 6,000 feet or more. Its fruits are smooth, solid-fleshed, and globe-shaped, but rather small (about half as large as those of Earliana). They are light green when immature but turn bright red at maturity. The chief defect of this variety is the small size of its fruits; although this would be of considerable importance in a commercial variety, it is not a

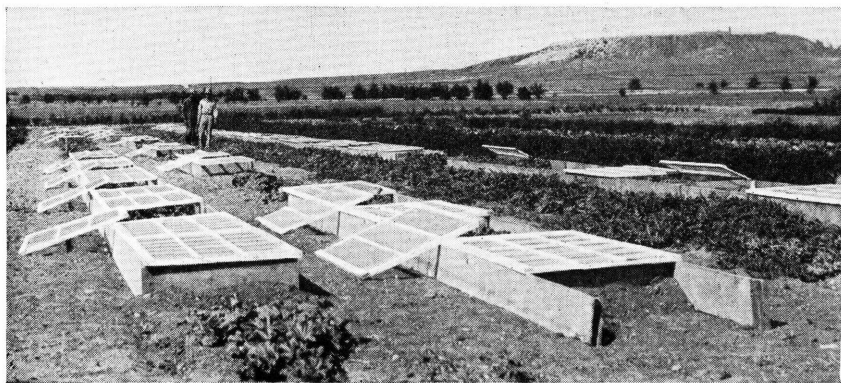


Figure 32.—Temporary frames constructed around cucumber plants to lengthen the growing season in the fall. Such frames or similar ones can be used successfully for tomatoes, cantaloups, or other crops.

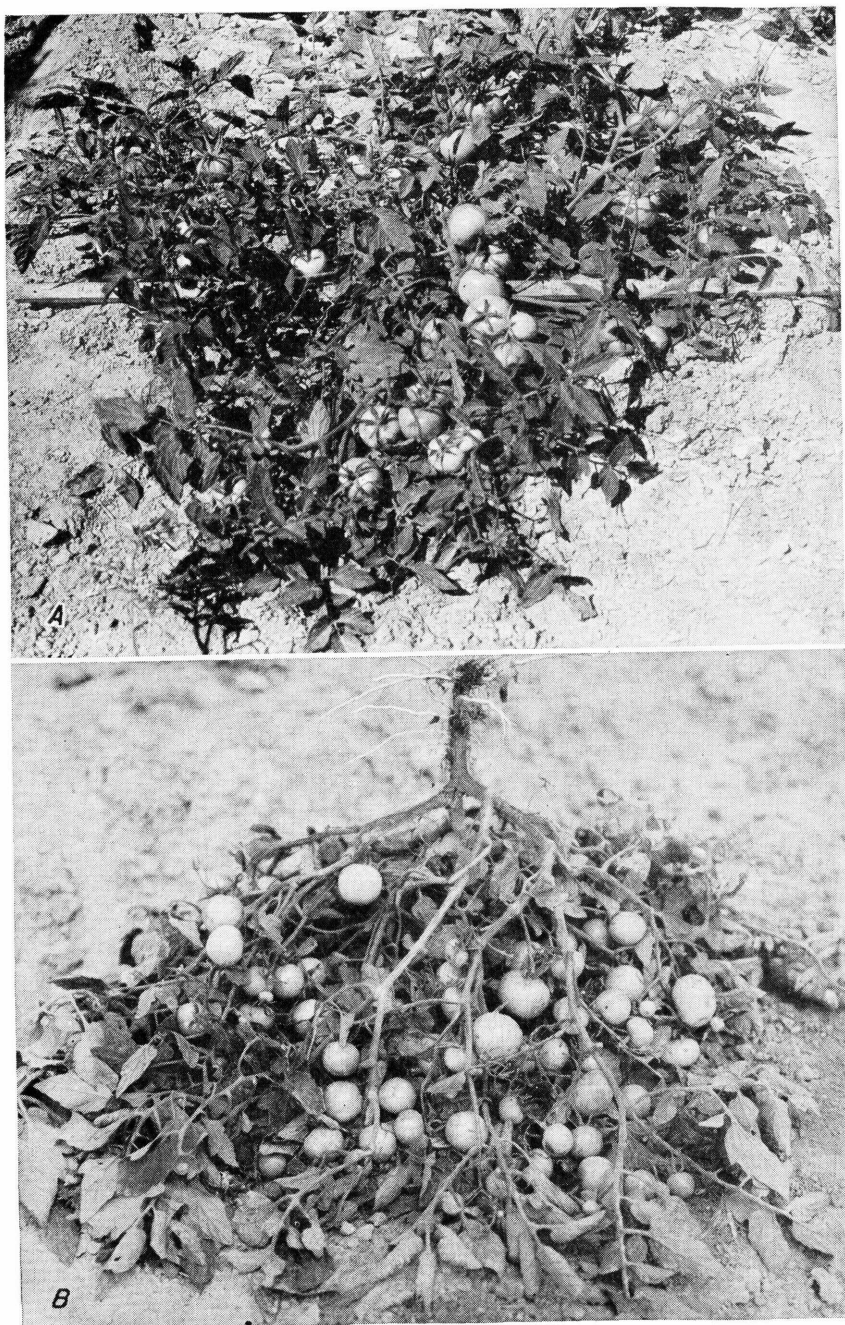


Figure 33.—Denmark tomato plant, showing heavy set of fruits: A, Top view; B, underneath view.

serious defect in a variety for the home garden. Red Cloud and Early Chatham also can be recommended as early-maturing varieties, especially valuable for the higher altitude sections of the region. They are of the nonvinning, or determinate, type and bear medium-sized, smooth, and fairly solid red fruits.

Bison and Bounty are second-early varieties, having medium-sized, red fruits. The fruits of Bison, however, are rather rough and inclined to be soft and not to keep well after harvest. Both are far better than average in fruit-setting ability during hot weather. They can be recommended for all sections of the region up to altitudes of about 6,000 feet.

Insects

Tomatoes cannot be grown successfully in many parts of the region unless the tomato psyllid is controlled. Although this insect is of the sucking type, it cannot be controlled by methods used against most such insects; it must be controlled by sulfur as either a spray or a dust. It is somewhat difficult to determine when psyllids are present, because they are small and feed mostly on the under sides of the leaves. Therefore it is best to spray or dust tomato plants with sulfur about 10 days after they are set in the garden. Treatments should be repeated every 7 to 10 days until the fruits are well formed. Sulfur for dusting should be very finely ground (325-mesh); ordinary sulfur, known as flowers of sulfur, is not satisfactory for use as a dust. For spraying purposes sulfur must contain a wetting agent so that it will mix with water. Such preparations are known as wettable sulfurs.

Varieties

Approximately 1,000 varieties and strains of tomatoes have been tested in recent years in this region. Of these about 20 were found to be adapted, and an even smaller number are readily available to the home gardener. Only a brief statement on the general characteristics of the recommended varieties and their range of adaptation can be given.

Speed, Millets Dakota, Schells No. 10, and Earliana are similar varieties in what might be called the Earliana group. They are indeterminate in growth habit, or produce fairly large, spreading vines. Their fruits are medium-sized to large, rather soft or thin-fleshed, and somewhat acid. They can be recommended as early varieties up to altitudes of about 5,000 feet, but at higher altitudes they become second or third early in maturity. Sioux, Bonny Best, and The Landreth, a selection from it, are very similar varieties. They have indeterminate medium-sized to large vines and produce medium-sized, very smooth, fairly solid high-quality fruits. They cannot be recommended for altitudes much over 4,500 feet. Both the Earliana and the Bonny Best type often fail to set good crops of fruits during hot, dry weather; where such conditions are common, Danmark, Bounty, or Sioux is recommended. Early Marglobe and Marglobe make exceptionally good yields in some localities and in some years, but their performance is not predictable; therefore they cannot be recommended for the home garden.

TURNIPS

A well-planned home garden should contain enough turnips to supply home needs. Many people believe that all turnips become either pithy or bitter very shortly after they reach edible size and that they cannot be stored for winter use. Such conceptions arise from the use of poor cultural methods and of unadapted varieties. The number of turnip varieties is relatively large; among them may be found those that are relatively free from bitterness, some that remain firm-fleshed for a relatively long time, and others that keep fairly well in storage. With such a wide range of characteristics to choose from, it is possible to find varieties suitable for practically any purpose.

Culture and Storage

Seed for the early crop of turnips should be planted about 5 days before the average date of the last killing frost. For a late crop or to produce roots for storage, seed should be sown about 2 months before hard freezes are expected (table 2).

Turnips do not thrive well under dry-land conditions unless the soil is exceptionally well supplied with moisture. Slow growth or a sudden check to their growth through lack of water will cause them to become tough or woody; lack of water is one of the chief causes of bitterness. Turnips keep best if they are stored in a cool, fairly moist room in a manner like that described for beets. Temperatures of 34° to 38° F. are best, and there should be sufficient humidity to keep them from withering.

Varieties

Purple Top Milan (fig. 34, A), White Milan, Early White Flat Dutch, and Purple Top Strap Leaved (fig. 34, B) are favorite early varieties (table 1). They are all strap-leaved and have flat roots with white flesh. They differ mainly in the color of the shoulder of the roots. These varieties are suitable only for the very early crop, because they do not keep well in storage and quickly become pithy or soft. They should not be depended upon for the main crop but only to furnish a supply until the later, better types mature. Purple Top Strap Leaved, the most popular, is the one recommended.

Snow Ball (White Six Weeks) (fig. 34, D) and White Egg are also supposed to belong to the first-early group, but they have been found to be rather slow maturing in this region and should be classed with the midseason varieties. Their names describe them rather well. Because both of these varieties are inclined to become bitter and woody, they cannot be highly recommended.

Purple Top White Globe is in a class by itself (fig. 34, C). Although it matures only a week to 10 days later than the first-early varieties, it may be classed with the midseason or late varieties, because it is relatively long standing, or slow to become pithy or spongy. The roots are reddish purple above the ground and white below; when in the best condition for use

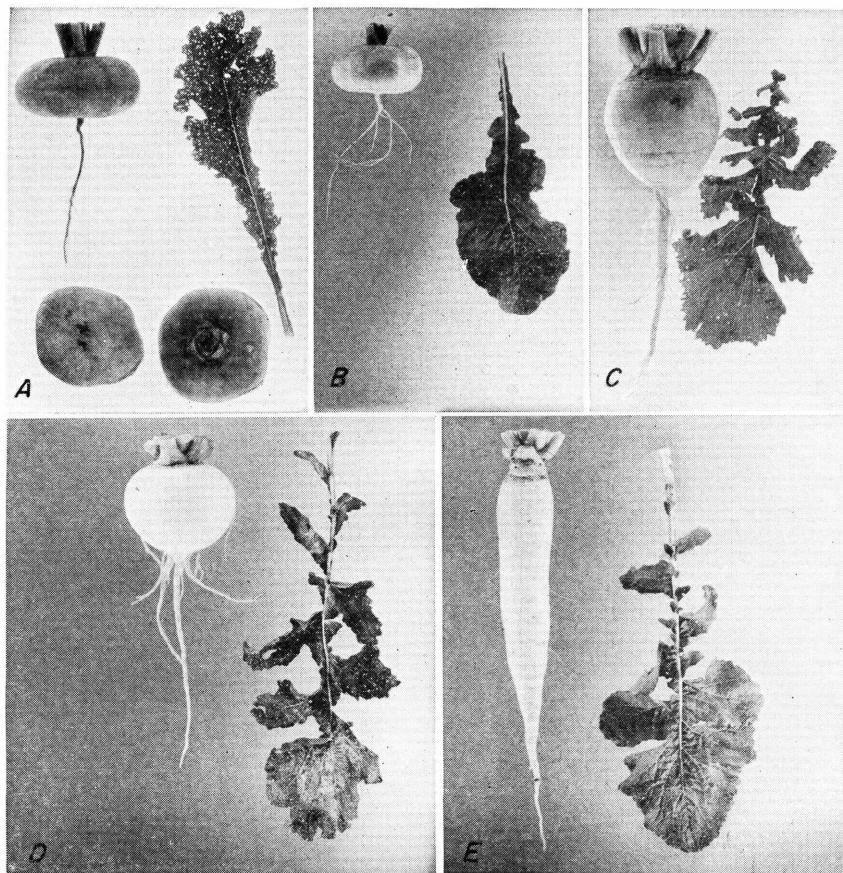


Figure 34.—Roots and leaves of five varieties of turnip: A, Purple Top Milan; B, Purple Top Strap Leaved; C, Purple Top White Globe; D, Snow Ball; E, Cow Horn.

they are 3 to 4 inches in diameter. The flesh is white, fine-grained, and of the best quality. If planted late, the variety keeps fairly well in storage.

Many people are prejudiced against the Cow Horn (Long White) variety because of its shape (fig. 34, E). However, if judged on the basis of the texture and quality of its flesh, it is one of the best varieties for this region; moreover, this variety retains its crispness and sweetness of flavor longer than other varieties under conditions that cause many of them to become inedible. The full-grown roots range from 8 to 12 inches in length and from 2 to 3 inches in diameter. The surface color is white with some green usually showing around the shoulder. The flesh is white, tender, crisp, and sweet. It is one of the latest maturing varieties and one of the best for storage. Golden Ball (Orange Jelly) is the yellow-fleshed variety most frequently listed in seed catalogs, but there is reason to doubt whether it is equal to Yellow Aberdeen Purple Top in quality and long-

standing ability. Tests at the Cheyenne Horticultural Field Station indicated that Golden Ball must be grown under the very best of conditions or it becomes pithy and bitter much sooner than Yellow Aberdeen Purple Top. Both of these yellow-fleshed varieties will keep if grown well and planted so that they will mature just when they are wanted for storage.

WATERMELONS

Watermelons require the same general climatic conditions for growth as cantaloups. At altitudes of 6,000 feet only the earliest varieties mature fruits; above 6,000 feet few if any varieties will do so. Contrary to the belief of many people, however, watermelons seem to be more widely adapted to the intermediate to high-altitude sections than cantaloups.

Culture and Storage

Methods of seeding or transplanting watermelons are similar to those described for cantaloups. They should be seeded at approximately the same time and require the same cultural treatment (table 2). They are slightly more drought-resistant than cantaloups, but very dry soil conditions are often the cause of ill-shaped, small fruits that rot at the blossom end.

Watermelons are much less perishable than cantaloups if they are not injured or cut; they can be kept from one to several weeks if stored in a cool place. If stored where the temperature is high, they soon become overripe and soft.

Varieties

There are many types and varieties of watermelon. To obtain good fruits of high quality, the home gardener must select his variety wisely. The limitations of varieties for commercial trade, as, for example, thickness of rind, size of fruit, or color of flesh, are relatively unimportant to the home gardener. The really important characteristic is quality, which includes sweetness, relative fineness of flesh, and ability to remain solid after reaching maturity.

In the low-altitude sections of this region practically all varieties of watermelons can be grown if irrigation water is available. For these sections probably the most widely grown and the highest quality watermelon is Kleckley Sweet. It has a thin rind; but its fine flesh, excellent flavor, and sweetness are the reasons for its high recommendation. Other red-fleshed varieties well adapted for similar sections are Early Kansas and Halbert Honey (table 1). Early Kansas is a round variety of only medium size, but somewhat earlier than Kleckley Sweet. Halbert Honey is larger fruited than Kleckley Sweet, but they are similar in other respects.

Winter Queen (Winter Watermelon, King and Queen, and Winter King) produces red-fleshed fruits suitable for storage for fall and winter use. The quality equals that of many other red-fleshed watermelons, but the flesh is somewhat coarser and more stringy. Winter Queen matures a few days later than Kleckley Sweet; therefore it can be grown only in the lower alti-

tude sections of the region. It is a valuable variety for the home garden in locations where it will mature, because if stored in a cool, dry place, the fruits will keep until Christmas. One method used by some gardeners is to store them in the edge of a straw-stack or some similar place where they will not freeze but will be cool and dry.

Many people will not eat yellow-fleshed watermelons, perhaps because they have associated red flesh with watermelons for such a long period. Nevertheless, many yellow-fleshed watermelons are superior in quality to most red-fleshed varieties. Several yellow-fleshed varieties have been introduced in the last few years. For low-altitude sections Luscious Golden Sweet can be recommended, although it has a tendency to become soft inside before it is entirely ripe.

For the higher sections of this region, several varieties can be recommended for use in the home garden. Among the red-fleshed varieties are Earliest and Sweetest, Arikara, Coles Early (Harris Earliest), and Northern Sweet. These varieties are early maturing and are of good quality when grown at intermediate to high altitudes. Yellow-fleshed varieties which can be highly recommended for use in these locations because of their earliness and excellent quality are Luscious Golden Sweet, Sweet Siberian, and Honey Cream. The last two varieties are small-fruited and very light green with darker green stripes.

WITLOOF CHICORY

Witloof chicory, frequently sold on the market as French endive, is used in the United States mainly as a salad plant; but it may also be used in various types of cookery. It is grown for the creamy-white heads formed when the roots are forced in sand or fine garden soil in late fall or in winter. These crisp, tender heads have a pleasant, sweetly bitter flavor somewhat resembling that of the dandelion. Witloof chicory salad is sometimes referred to as the "king of salads" or the "rich man's salad," probably because it is commonly served only in the better hotels and restaurants. It is well adapted to this region (table 1), however, and there is no reason why home gardeners cannot grow their own supply of this delicious vegetable to add variety to the winter diet.

Culture, Harvest, and Storage

The seed of Witloof chicory is planted directly in the garden in the spring as soon as danger of killing frost is over. The small seedlings resemble those of lettuce or endive. When they are 1 to 2 inches in height, they should be thinned to approximately 6 inches between plants; it is important that they be thinned to single plants if smooth, well-shaped roots are to be produced for forcing (table 2). The crop can be grown where the altitude does not exceed about 6,500 feet; as it is a long-season crop it will not usually produce roots large enough for forcing if grown at higher altitudes. At lower altitudes or where the growing season is much in excess of 125 days, there is some danger that the roots will grow too large for best results in

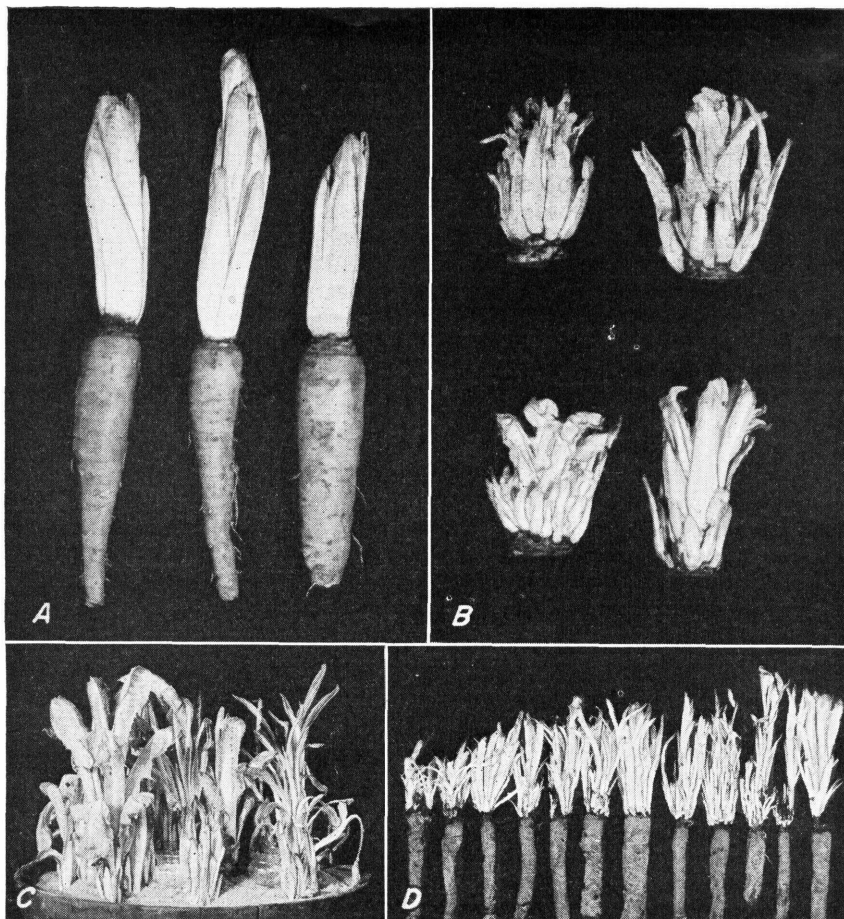


Figure 35.—*A*, Well-shaped heads of Witloof chicory produced by forcing roots under 6 inches of sand; *B*, undesirable heads produced by too large roots; *C*, roots being forced in bucket without covering layer of sand; *D*, typical heads from roots forced without sand covering.

forcing. In such locations the seeding date should be somewhat delayed. Figure 35, *B*, shows undesirable types of heads produced by very large roots. No special care is necessary to grow the crop except to control weeds and to apply irrigation water to promote continuous growth. Although Witloof chicory does not require so much water as many other vegetables, it is not well adapted to strictly dry-land culture.

The roots are harvested in the fall before hard freezes occur, but they should be allowed to grow as long as possible, especially in locations with a fairly short growing season. The roots are often 12 to 15 inches in length at maturity, and at harvest as much of the root should be obtained as possible. Figure 36 shows a typical well-grown plant. If only a few are being grown in the home garden, they can be dug up easily with a spade. After the roots have been removed from the soil, the tops are cut off

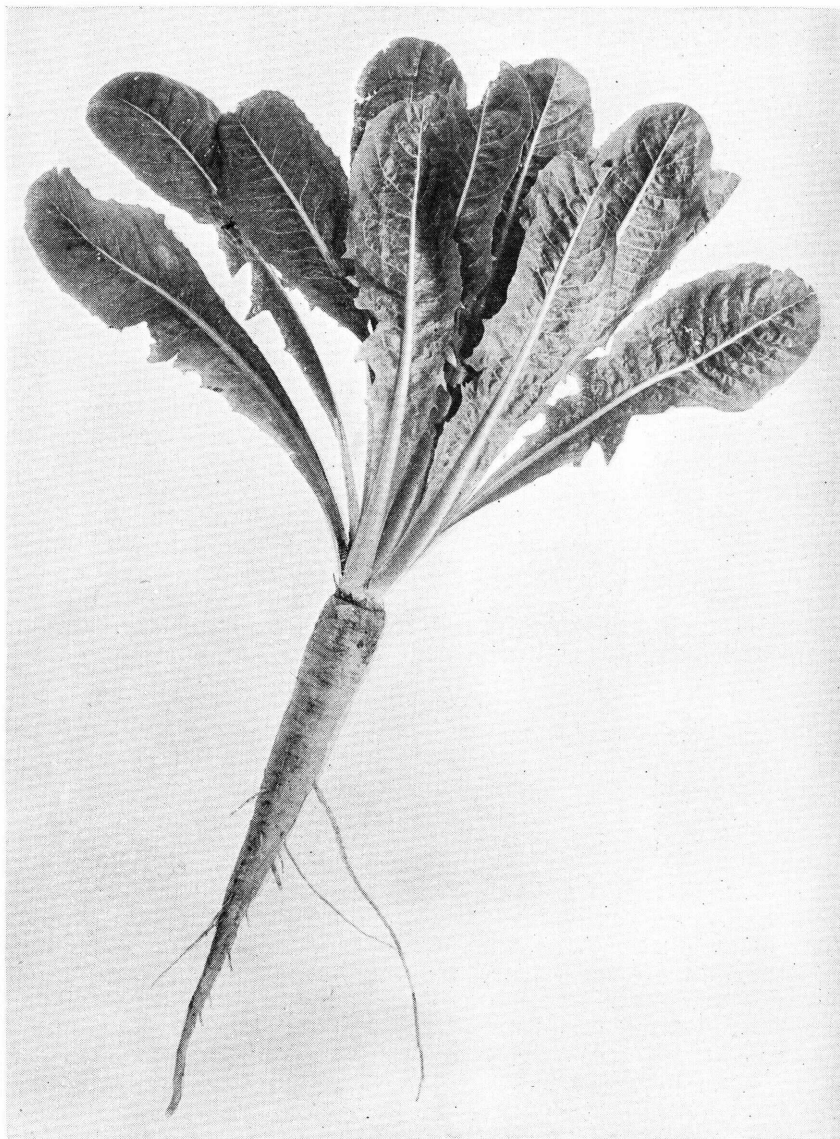


Figure 36.—Typical well-grown plant of Witloof chicory.

about half an inch from the root. Care should be taken not to cut into the crown of the root, because this increases the chances of decay in storage.

Unless the roots are to be forced immediately, they should be stored as soon as possible after they are dug, to prevent serious wilting. The most desirable method of storing is to put them between layers of slightly moist sand in a cellar or other cool place where they will not freeze. This is done by starting with a 2- or 3-inch layer of sand and then alternating layers of roots and sand. The temperature of the storage must be kept near

35° F. to prevent growth of the roots until they are desired for forcing.

Forcing

The edible product is produced by forcing the roots in beds, boxes, or other containers. Forcing is usually accomplished by standing the roots upright in a container and firming soil around them. Water is then applied to wet the soil thoroughly. Later a 6-inch layer of dry sand or fine garden soil is added. No further watering is necessary during the forcing period. By this method of forcing a compact head 6 to 8 inches in length and about 2 inches in diameter is formed (fig. 35, A). Roots can also be forced by packing the roots in sand or soil and omitting the covering layer. If this method is used, the plants must be forced in a dark room and they produce a loose head composed of long, slender, blanched leaves rather than a compact head (fig. 35, C, D). For best results the temperature of the forcing room should be maintained between 55° and 65° F. At higher temperatures growth is more rapid, but the heads are slightly inferior to those forced at about 60°. Well-formed heads blanched to creamy white are of very high quality. To produce good, solid heads, about 4 weeks is necessary from the time the forcing process is started. Sometimes a second crop can be produced from the same roots, but more often the roots are discarded after one crop of heads has been produced.

Varieties

When buying seed one should be careful to order Witloof chicory (French endive), because other types of chicory are unsuitable for forcing purposes.

WONDERBERRIES

The wonderberries (sunberries, garden huckleberries) belong to the same family of plants as tomatoes, eggplant, and peppers. The plant is a sprawling annual grown for its black or purplish-black fruits. When mature, these fruits are approximately half an inch in diameter and have the general appearance of grapes. They are excellent for pies, jams, and preserves. Because of their early maturity wonderberries can be grown at higher altitudes than tomatoes and therefore make a welcome addition to the home-garden fruit crops.

Early plants should be started indoors by the same methods used for tomatoes and set in the garden after all danger of frost is over (table 2). Wonderberries are drought-resistant and therefore are well adapted to dry land. If grown under irrigation, one or two applications of water are sufficient to produce good crops. The berries are picked when they turn dark purple and become slightly soft.

There are no varieties of wonderberry (table 1).

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